



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

L Sec 1816 (110 11)

16 17

37

17

March 1895

NEW COLLEGE LIBRARY

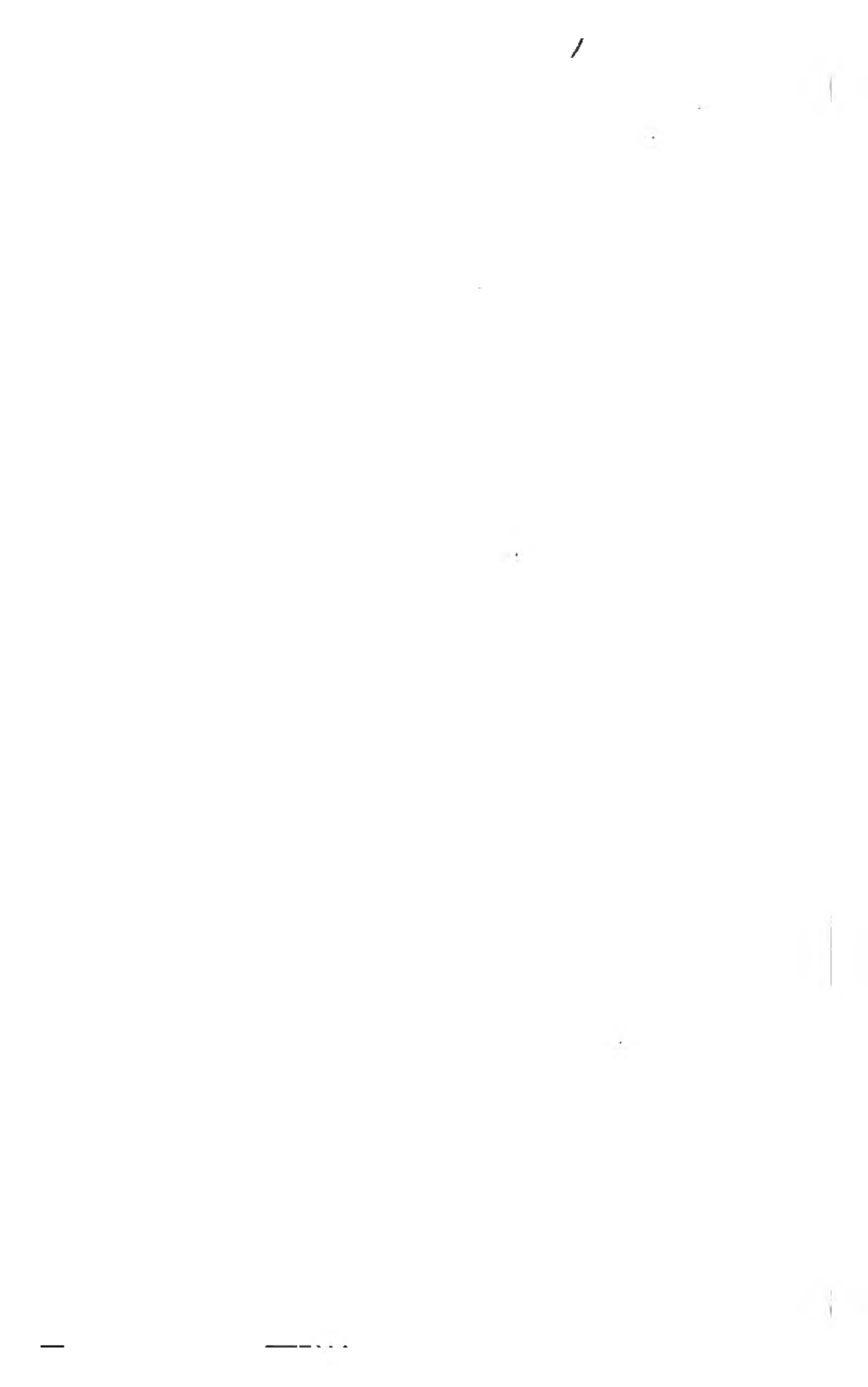
ought with the income of

THE KELLER FUND

Bequeathed in Memory of
JASPER NEWTON KELLER
BETTY SCOTT HENSHAW KELLER
MARIAN MANDELL KELLER
RALPH HENSHAW KELLER
CARL TILDEN KELLER

ME 20

LAS

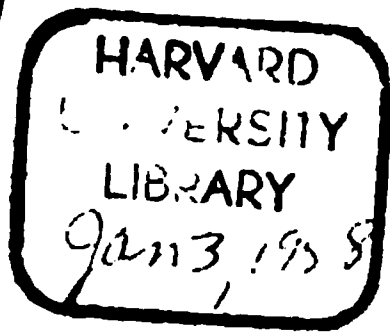


PROCEEDINGS
OF THE
LITERARY AND PHILOSOPHICAL SOCIETY
OF
LIVERPOOL,
DURING THE
FIFTY-FIRST SESSION, 1861-62.
No. XVI.

LIVERPOOL:
PRINTED FOR THE MEMBERS OF THE SOCIETY,
BY THOMAS BRAKELL, 7, COOK STREET.

1862.

Δ
L500 18 16.5 (16-17)
✓



✓ 785

This Volume has been edited by the Hon. Secretary.

The Authors have usually revised their papers.

The Authors alone are responsible for facts and opinions.

**The Society exchanges Proceedings with other publishing bodies,
through the Secretary, from whom back numbers may be obtained.**

C O N T E N T S .

| | PAGE. |
|---|-------|
| COUNCIL | v. |
| LIST OF MEMBERS | v. |
| HONORARY MEMBERS | xiii. |
| ASSOCIATES..... | xv. |
| BALANCE SHEET..... | xvi. |
| ANNUAL MEETING—Report | 1 |
| FIRST ORDINARY MEETING | 9 |
| Additions to Fauna | 10 |
| Additions to Flora | 12 |
| Mr. Jas. Yates, M.A., F.R.S., Hon. Member—"On the Excess of Water in the Region of the Earth about New Zealand : its Causes and Effects" .. | 14 |
| EXTRAORDINARY MEETING | |
| Laws for the Admission of <i>Associates</i> | 25 |
| SECOND ORDINARY MEETING | 27 |
| Dr. Ihne, V.P.—"On the Study of the Classical and Modern Languages" | 27 |
| THIRD ORDINARY MEETING | 45 |
| Dr. Collingwood—"On the Opportunities of Advancing Science enjoyed by the Mercantile Marine" | 46 |
| FOURTH ORDINARY MEETING | 58 |
| Mr. E. E. Holden—"On Animal Charcoal" ... | 61 |
| EXTRAORDINARY MEETING | 62 |
| FIFTH ORDINARY MEETING | 63 |
| EXTRAORDINARY MEETING—Alterations in Laws..... | 66 |
| SIXTH ORDINARY MEETING | 67 |
| Mr. P. H. Rathbone—"An Apology for Shak- spere's Lady Macbeth" | 69 |
| SEVENTH ORDINARY MEETING | 78 |

| | PAGE. |
|---|-------|
| EIGHTH ORDINARY MEETING | 79 |
| Mr. J. A. Picton, F.S.A.—“On the Ancient Gothic Language, and its place in the Indo-European Family” | 81 |
| NINTH ORDINARY MEETING | 109 |
| Rev. T. P. Kirkman, M.A., F.R.S., Honorary Member—“On a so-called Theory of Causation.” (Vide “System of Logic,” by J. S. Mill, Book iii, c 5.) | 112 |
| Rev. J. S. Howson, D.D.—“High Street, and the Roman Roads in the N.W. of England”.. | 131 |
| TENTH ORDINARY MEETING | 134 |
| Rev. Hermann Baar, Ph.D.—“On Hamlet and Faust” | 135 |
| ELEVENTH ORDINARY MEETING | 151 |
| TWELFTH ORDINARY MEETING | 153 |
| Rev. C. D. Ginsburg—“The Karaites, their History and Literature” | 155 |
| THIRTEENTH ORDINARY MEETING | 171 |
| Dr. Collingwood—“Contributions to British Ornithology, No. 2 ;—The Migration of Birds” | 173 |

APPENDIX I.—An account of the Proceedings of the Jubilee Festival of the Literary and Philosophical Society, held March 13th and 15th, 1862.

APPENDIX II.—Suggestions offered on the part of the Literary and Philosophical Society of Liverpool, to Members of the Mercantile Marine, who may be desirous of using the advantages they enjoy for the promotion of Science, in furtherance of Zoology.

Donations received during the Session.

SESSION LI., 1861-62.

COUNCIL.

President.

REV. HENRY H. HIGGINS, M.A., Cantab.

Vice-Presidents.

WILLIAM IHNE, Ph.D.

J. BIRKBECK NEVINS, M.D., Lond.

J. BAKER EDWARDS, Ph.D., F.C.S.

Treasurer.

ISAAC BYERLEY, F.L.S., F.R.C.S.

Hon. Secretary.

CUTHBERT COLLINGWOOD, M.A. & M.B., Oxon, F.L.S., &c.

THOMAS J. MOORE, C.M.Z.S.

GEORGE H. MORTON, F.G.S.

CHARLES CLARK.

REV. J. ROBBERDS, B.A.

REV. W. BANISTER, B.A.

(Resigned 16th. Dec., 1861.)

D. WALKER, M.D., F.L.S., M.R.I.A.

CHARLES SPENCE.

THOMAS DOBSON, B.A.

REV. CHR. D. GINSBURG.

JOSEPH C. REDISH.

(Elected 16th Dec., 1861.)

ORDINARY MEMBERS,

ON THE SOCIETY'S ROLL AT THE CLOSE OF THE 51st SESSION.

Those marked † are Original Members of the Society.

Life Members are marked with an asterisk.

Oct. 11, 1833 Aikin, James, Esq., 2, *Drury-lane*, and 4, *Gambier-terrace*.

Dec. 10, 1860 Alexander, James, 8, *York Buildings*, *Dale-street*, and
24, *Bedford-street South*.

Jan. 8, 1861 Anderson, David, *Castle-street*, and 7, *Church-street*,
Egremont.

- Dec. 11, 1854** Andrew, John, *Fenwick Chambers*, and *Sandown-park, Wavertree*.
- *Nov. 28, 1853** Archer, Professor, F.R.S.E., F.R.S.S.A., President of the Botanical Society of Edin., Director of the Industrial Museum of Scotland, *Edinburgh*.
- Feb. 22, 1855** Avison, Thomas, F.S.A., 18, *Cook-street*, and *Fulwood-park, Aigburth*.
- Dec. 10, 1860** Baar, Rev. Hermann, Ph.D., 15, *Sandon-street*.
- May 1, 1854** Bahr, George W., 4, *Cable-street*, and 2, *South-hill Grove, Aigburth*.
- Oct. 29, 1860** Banister, Rev. W., B.A., *St. James' Mount*.
- Jan. 13, 1862** Baruchson, Arnold, 35, *Dale-street*, and *Blundell-sands, Great Crosby*.
- Oct. 31, 1859** Batty, Thomas, M.R.C.S., *Greenfield House, Liscard-rd*.
- Mar. 9, 1857** Bell, Christopher, *Moor-st.*, and 60, *Bridge-st., Birkenhead*.
- Feb. 6, 1854** Bennett, William, 65, *Sir Thomas's Buildings*, and 109, *Shaw Street*.
- Oct. 31, 1859** Birch, James, 18, *Rumford-place*, and 7, *Upper Baker-st*.
- Feb. 4, 1856** Bird, W. Vallentine, M.D. Aberd., *Seacombe*.
- April 15, 1861** Blake, James, 63, *Kitchen-street*, and 45, *Canning-street*.
- Oct. 31, 1859** Bloxam, Frederick William, *Albany, Oldhall-street*, and 157, *Islington*.
- Nov. 7, 1834** Boulton, Francis, 26, *Chapel-street*, and 15, *Devonshire-place, Cloughton*.
- *Mar. 6, 1835** Boulton, Swinton, 1, *Dale-street*, and 3, *Bedford-street South*.
- Nov. 13, 1854** Bretherton, Edward, F.G.S., 21, *Harrington-street*, and 47, *Hamilton Square, Birkenhead*.
- Oct. 21, 1844** Bright, Samuel, 1, *North John-st.*, and *Sandheys, Mill-lane, West Derby*.
- *Jan. 8, 1855** Brockholes, James Fitzherbert, *Puddington Old Hall, near Neston*.
- April 21, 1862** Bulley, Samuel, *East Lodge, Prince's-park*.
- Dec. 2, 1851** Browne, G. Mansfield, 15, *Fenwick-street*, and 15, *South-hill-road, Toxteth-park*.
- May 3, 1857** Burton, Rev. Charles Henry, M.A., 1, *Sandon-terrace*.
- *May 1, 1848** Byerley, Isaac, F.L.S., F.R.C.S., *Victoria-road, Seacombe*.
- April 7, 1862** Campbell, John, *Liverpool and London-chambers*, and *Oak House, Aigburth-hall road*.

- April 7, 1862 Cawkitt, James M., 28, *Chapel-street*, and 28, *Queen-road*, *Everton*.
- Dec. 2, 1861 Chadburn, William, 71, *Lord-street*.
- Dec. 1, 1851 Clare, John Leigh, 11, *Exchange-buildings*, and 22, *Richmond-terrace*, *Breck-road*.
- Oct. 31, 1859 Clark, Charles, 17, *North John-st.*, and *Linden Cottage*, *Rock Ferry*.
- Jan. 26, 1857 Clay, William, 97, *Seston-street*, and 4, *Parkhill-road*.
- Nov. 16, 1857 Cooper, Joseph, *Oak House*, *Aigburth*.
- May 31, 1858 Collingwood, Cuthbert, M.A., M.B., Oxon, M.R.C.P., F.L.S., Lect. on Botany, Royal Infirmary Sch. of Med; Phys. to the Northern Hospital, 15, *Oxford-street*.
- Jan. 22, 1850 Cox, Henry, 19, *Brunswick-street*, and *Poplar-rd.*, *Oxton*.
- Jan. 26, 1857 Dadabhai Naoroji, Professor of Gujarati, London University, 32, *Great St. Helens*, *London, E.C.*
- *April 6, 1840 Dickinson, Joseph, M.A., M.D.Dub., F.R.C.P., F.R.S., M.R.I.A., F.L.S., 92, *Bedford-street South*.
- Dec. 12, 1859, Dobson, Thomas, B.A., *Hexham Grammar School*, *Northumberland*.
- Nov. 27, 1848 Dove, Percy Matthew, F.S.S., 1, *North John-street*, and 49, *Hamilton-square*, *Birkenhead*.
- Jan. 23, 1848 Drysdale, John James, M.D. Edin., M.R.C.S. Edin., 44, *Rodney Street*.
- Feb. 4, 1856 Duckworth, Henry, F.L.S., F.R.G.S., F.G.S., 5, *Cook-street*, and 2, *Gambier-terrace*.
- Jan. 9, 1837 Duncan William Henry, M.D. Edin., Medical Officer of Health, 2, *Cornwallis-street*, and 17, *Peel-terrace*, *Upper Canning-street*.
- April 29, 1861 Eccles, Alex., B.A. Cantab., 12, *Tithebarn-street*, and *Huyton*.
- *Nov. 27, 1848 Edwards, John Baker, Ph.D. Gies., F.C.S., Lect. on Chemistry, Liverpool Royal Infirmary Sch. of Med., *Royal Institution Laboratory*, and *Waterloo*.
- Mar. 10, 1862 Ellison, Christopher O., 20, *Clayton-square*, and 29, *Falkner-street*.
- Dec. 15, 1856 England, Rev. James, M.A., 158, *Chatham-street*.
- April 7, 1862 English, Charles J., 26, *Chapel-street*, and *Falkner-sq.*

- Nov. 18, 1850 Evans, Henry Sudgen, F.C.S., 52, *Hanover-street*, and 94, *Huskisson-street*.
- Feb. 24, 1862 Ewer, Harry Alexander, 21, *Harrington street*, and 57, *Canning-street*.
- April 30, 1860 Fabert, John Otto William, 1, *Parliament-street*, and 3, *St. James' Mount*.
- *Dec. 14, 1846 Faram, John, 8, *Railway Cottages, Edge-hill*, and *Lime-street, Railway-station*.
- *Dec. 13, 1852 Ferguson, William, F.L.S., F.G.S., 2, *St. Aidan's terrace, Birkenhead*.
- Feb. 24, 1862 Flamank, John W., 16, *Temple-street*, and *Victoria Villa, Derby-road, Bootle*.
- *April 3, 1837 Fletcher, Edward, 4, *India-buildings*, and 31, *High Park-street*.
- *Mar. 10, 1855 Foard, James Thomas, 12, *Salisbury-street, Strand, London*.
- *Feb. 6, 1854 Gee, Robert, M.D. Heidelb., M.R.C.P., Lect. on Patholog. Anat. Royal Infirmary Sch. of Med.; Physician, Workhouse Hospital; 10, *Oxford-street*.
- March 4, 1861 Ginsburg, Rev. Christian D., 10, *Rake-lane*.
- March 3, 1856 Grainger, John, B.A., 4A, *Chapel-street*, and *Belfast*.
- Dec. 2, 1861 Graves, Samuel R., *Baltic-buildings*, and *The Grange, Wavertree*.
- Nov. 14, 1858 Greenwood, Henry, 32, *Castle-st.*, and *Roseville, Huyton*.
- Nov. 30, 1857 Grimmer, William Henry, 15, *Cable-st.*, and 64, *Grove-st.*
- Jan. 22, 1855 Hakes, James, M.R.C.S., Surgeon to the Northern Hospital, 12, *Maryland-street*.
- Oct. 18, 1858 Hamilton, Robert Gordon, 12, *Tithebarn-street*, and *Olive-park, Sandown Lane, Wavertree*.
- *Jan. 21, 1856 Hardman, Lawrence, *York-buildings, Sweeting street*, and *Rock-park, Rock-ferry*.
- Nov. 14, 1857 Hartley, John Bernard, *Coburgh Dock*, and *Allerton*.
- Jan. 13, 1862 Harvey, Enoch, 12, *Castle-street*, and *Greenheys, Riversdale-road, Aigburth*.
- April 27, 1862 Hausburg, Friedrich Leopold Ludwig, *Rosensfels, Woolton*.
- *Mar. 7, 1842 Heath, Edward, Esq., *Orange-court, 37, Castle-street*, and *St. Domingo-grove, 114, Breckfield-road N., Everton*.

- Dec. 12, 1855 Hess, Ralph, *Albany, Oldhall-street*, and 17, *Upper Duke-street*.
- Dec. 28, 1846 Higgins, Rev. H. H., M.A., Cantab., F.C.P.S., *Rainhill*.
- *Oct. 31, 1836 Higginson, Alfred, M.R.C.S., Hon. Lect. on Anatomy, Liverpool Soc. of Fine Arts; Surg. Southern Hosp., 44, *Upper Parliament-street*.
- Mar. 4, 1861 Hindley, Rev. H. J., M.A., 3, *Grecian-terrace, Everton*.
- Jan. 12, 1857 Holden, E. Erasmus, *Appleton-in-Widnes, Warrington*.
- Nov. 13, 1854 Holland, Charles, 17, *Tower-buildings, North*, and *Liscard Vale, New Brighton*.
- Mar. 22, 1847 Horner, Henry P., 2, *Derby-square*, and 5, *Devonshire-road, Prince's-park*.
- Nov. 4, 1850 Howson, Rev. John Saul, D.D. Trin. Col. Cantab. Principal of the Collegiate Institution, *Shaw-street*, and *Dingle-park, Dingle-lane*.
- Dec. 27, 1841 Hume, Rev. Abrah., D.C.L. Dub., LL.D. Glas., F.S.A., 24, *Clarence-street, Everton*.
- *Nov. 13, 1854 Hunter, John, Memb. Hist. Soc. Pennsylvania, *Herne, Charlotte-town, Prince Edward's Island*.
- Jan. 13, 1862 Hutchison, Robert, Mayor of Liverpool, *Barned-buildings, Sweeting-street*, and 6, *Canning-street*.
- Jan. 26, 1857 Hutton, David, 3, *St. George's Crescent*, and 61, *Canning-street*.
- *Apr. 29, 1850 Ihne, William, Ph.D. Bonn, President of the Philomathic Society, 316, *Upper Parliament-street*.
- Feb. 23, 1857 Imlach, Henry, M.D. Edin., 1, *Abercromby-square*.
- *Oct. 21, 1844 Inman, Thomas, M.D. London, M.R.C.P., Phys. Royal Infirmary, 12, *Rodney-street*, and *Spital, Cheshire*.
- Mar. 10, 1862 Johnson, Richard, *Queen Insurance-buildings*, and *Brookfield House, Seaforth*.
- Jan. 23, 1854 Jones, John, 28, *Chapel-street*, and 70, *Rodney-street*.
- *April 4, 1852 Jones, Morris Charles, *Queen's Insurance-buildings*, and 75, *Shaw-street*.
- May 5, 1851, Jones, Roger Lyon, *Liverpool and London Chambers, Exchange*, and 6, *Sunnyside, Prince's-park*.
- Jan. 13, 1862 Jones, William Henry, *Liverpool and London-chambers*.
- Nov. 26, 1860 Kenworthy, James, M.D., *Parkgate, Cheshire*.

Feb. 19, 1855 King, Alfred, 14, *Newington*, and 9, *Netherfield-rd. South*.
 Oct. 29, 1860 Kirby, Frederick, *Free Public Museum*, and 9, *Prince's Park Terrace*.

Jan. 10, 1848 Lamport, William James, 21, *Water-street*, and 5, *Beech-terrace, Beech-street, Fairfield*.

*Jan. 14, 1839 Lassell, William, F.R.SS.L. and E., F.R.A.S., 27, *Milton-street*, and *Broadstones, Sandfield-park, West Derby*.

April 27, 1862 Lassell, William Jun., 27, *Milton-street*, and *Tus Brook*.

Oct. 21, 1844 Lear, John, 1, *North John-st.*, and 22, *Holland-terrace, Duke-street, Edge-hill*.

Feb. 23, 1858 Lewis, James, *Liverpool and London Chambers, Exchange*, and 1, *Parkfield-road, Prince's-park*

Feb. 10, 1862 Leycester, Edmund Mortimore, Commander R.N., *Admiralty Office*, 2, *Drury-lane*, and 20, *Belvedere-road, Prince's-park*.

Dec. 10, 1860 Leyland, Joseph, *Williamson-square*.

Feb. 22, 1857 Little, Robert, *Liverpool and London Chambers, Exchange*, and *Rainhill*.

Oct. 20, 1859 M'Andrew, James Johnston, 5, *North John-street*, and *Greenfield Cottage, Bromborough*.

*Oct. 21, 1844 M'Andrew, Robert, F.R.S., F.L.S., *Isleworth House, Isleworth, London*.

March 9, 1857 MacFie, Robert Andrew, 30, *Moorfields*, and *Ashfield Hall, Neston, Cheshire*.

April 4, 1853 Marrat, Frederick Price, 22, *Arcade*, and 2, *Peverille-terrace, Edge-lane*.

Jan. 21, 1839 Martin, Studley, *Exchange-chambers*, and 109, *Bedford-st.*

Feb. 5, 1844 Mayer, Joseph, F.S.A., F.R.A.S., F.E.S., 68, *Lord-street*.

April 1, 1861 Melly, George, 7, *Water-street*, and 90, *Chatham-street*.

May 2, 1853 Milner, Rev. James Walker, M.A., 1, *Deronshire-terrace*, 324, *Upper Parliament-street*.

Oct. 31, 1859 Moore, Thomas John, Corr. Mem. Z.S., Curator Free Public Museum, *William Brown-street*, and 12, *St. Alban's, Whitefield-road, Everton*.

Jan. 8, 1855 Morton, George Highfield, F.G.S., 9, *London-road*.

April 16, 1849 Moss, Rev. John James, B.A., *Upton, Cheshire*.

Oct. 29, 1850 Mott, Albert Julius, 19, *South Castle-st.*, and *Holt-hill*.

- April 3, 1854 Mott, Charles Grey, 27, *Argyle-street, Birkenhead*, and 2, *Shewell's-road, Holt-hill*.
- Dec. 2, 1861 Mulvany, Charles, 4, *Canning-terrace, Upper Parliament street*.
- Dec. 2, 1861 Mulvany, Henry, 4, *Canning-terrace, Upper Parliament street*.
- Oct. 20, 1856 Nevins, John Birkbeck, M.D., Lond., M.R.C.S., Lect. on *Materia Medica*, Roy. Infirmary School of Medicine, 25, *Oxford-street*.
- April 7, 1862 Newlands, Alexander, 6, *Rumford-place*, and 13, *Canning-street*.
- Dec. 15, 1851 Newlands, James, F.R.S.S.A., Borough Engineer, 2, *Cornwallis-st.*, and 4, *Clare-terrace, Duke-st. North, Edge Hill*.
- *Nov. 29, 1847 Nisbet, William, L.F.P.S.G., *Church-st., Egremont*.
- *Oct. 15, 1855 North, Alfred, *Salcombe Hill, Sidmouth, Devonshire*.
- Nov. 18, 1861 Nugent, Rev. James, Principal of the Catholic Institute, 26, *Hope-street*.
- Nov. 4, 1861 Philip, Thomas, 49, *South Castle-street*, and 47, *Prospect-vale, Fairfield*.
- Dec. 28, 1846 Picton, James Allanson, F.S.A., Chairman of the Library and Museum Committee, 11, *Dale-street*, and *Sandy-knove, Wavertree*.
- Feb. 6, 1854 Prange, F., *Royal Bank-buildings, Dale-street*, and 2, *Grove-park, Lodge-lane*.
- April 7, 1862 Rankin, Robert, Chairman of the Dock Board, 55, *South John-street*, and *Brombro' Hall, Cheshire*.
- †Mar. 13, 1812 Rathbone, William, 20, *Water-street*, and *Greenbank, Wavertree*.
- Nov. 12, 1860 Rathbone, Philip H., 4, *Water-street*, and *Greenbank-cottage, Wavertree*.
- Mar. 24, 1862 Rathbone, Richard Reynolds, 21, *Water-street*, and *Laurel Bank, St. Michael's-road*.
- Jan. 13, 1862 Rawlins, Charles Edward, 23, *Oable-street*, and 4, *Blackburn-terrace*.
- *Jan. 7, 1856 Rawlins, Charles Edward, Jun., 23, *Oable-street*, and 1, *Windermere-terrace, Prince's-park*.

- *Nov. 17, 1851 Redish, Joseph Carter, Vice-President of the Philomathic Society, 18, *Chapel-st.*, and *Church-rd.*, *Wavertree*.
- Mar. 20, 1854 Rigge, Thomas, 64, *Rodney-street*.
- Nov. 2, 1840 Robberds, Rev. John, B.A., 58, *High Park-street*.
- Jan. 21, 1861 Roberts, Henry Benjamin, 16, *Pine-street*.
- Feb. 10, 1862 Rogers, Thomas Law, M.D., M.R.C.P., Superintendent, *County Asylum, Rainhill*.
- April 18, 1854 Rowe, James, 2, *Chapel-walks*, and 51, *Shaw-street*.
- April 7, 1862 Samuel, Harry S., 1, *Victoria-buildings, Hackins'-hey*, and 2, *Canning-street*.
- May 26, 1856 Samuelson, Newton, F.C.S., 3, *Hackin's-hey*, and 43, *Hope-street*.
- April 6, 1846 Scholfield, Henry Daniel, M.D. Oxon, M.R.C.S., 14, *Hamilton-square, Birkenhead*.
- April 21, 1862 Smith, James, *Barkeley House, Seaforth*.
- †Mar. 13, 1812 Smith, James Houlbrooke, 28, *Rodney-street*, and *Green-hill, Allerton*.
- Feb. 24, 1862 Snape, Joseph, Lecturer on Dental Surgery, Royal Infirmary School of Medicine, 75, *Rodney-street*.
- Nov. 12, 1860 Spence, Charles, 4, *Oldhall-street*, and 21, *Catherine-street*.
- Feb. 10, 1862 Spence, James, 30, *North John-street*, and 54, *Upper Parliament-street*.
- Dec. 14, 1857 Steele, Robert Topham, 4, *Water-street*, and 8, *Bedford-street South*.
- Dec. 2, 1861 Steinthal, Rev. Samuel Alfred, 59, *Rodney-street*.
- Oct. 18, 1858 Stuart, Richard, 10, *Exchange-street East*, and *Brooklyn Villa, Breeze-hill, Walton*.
- *Feb. 19, 1855 Taylor, John Stopford, M.D. Aberd., F.R.G.S., 1, *Springfield, St. Anne-street*.
- Jan. 23, 1843 Taylor, Robert Hibbert, M.D. Edin., L.R.C.S., Ed., Lect. on Ophthalmic Medicine, Royal Infirmary School of Medicine, 1, *Percy-street*.
- Dec. 11, 1854 Thompson, Samuel H., *Thingwall Hall, Knotty Ash*.
- Nov. 17, 1856 Tinling, Chas., 60, *Castle-st.*, and *Bedford-terrace*, 48, *Low-hill*.
- Nov. 26, 1860 Tooke, William H., *Church-street*, and *Wellington-street, Waterloo*.
- Dec. 1, 1851 Towson, John Thomas, F.R.G.S., Scientific Examiner, Sailor's Home, 47, *Upper Parliament-street*.

- *Feb. 19, 1844 Turnbull, James Muter, M.D. Edin., M.R.C.P., Phys.
Royal Infirmary, 86, *Rodney-street*.
- Nov. 16, 1857 Tymbas, Gregory, *York Buildings*, 14, *Dale-street*, and
Edge lane Hall.
- Oct. 21, 1861 Unwin, William Andrew, 11, *Rumford-place*, and
Newbie-terrace.
- Oct. 21, 1844 Vose, James Richard White, M.D. Edin., F.R.C.P.,
Phys. Royal Infirmary, 5, *Gambier-terrace*.
- Oct. 29, 1860 Walker, David, M.D., F.L.S., F.R.G.S., M.R.I.A., 8,
Beaufort-terrace, Seacombe.
- Mar. 18, 1861 Walker, Thomas Shadford, M.R.C.S., 54, *Rodney-street*.
- Jan. 27, 1862 Walmsley, Gilbert G., 50, *Lord-street*.
- Feb. 10, 1862 Weightman, John Hardham, 57, *Ranelagh-street*, and
27, *Baker-street, Low Hill*.
- Dec. 2, 1861 Weightman, William Henry, Secretary Polytechnic
Society, *Leith Offices, Moorfields*, and *Hapsford-lane*,
Litherland.
- April 7, 1862. Whittle, Ewing, M.D., Lecturer on Med. Jurisprudence,
Royal Inf. Sch. of Med., 65, *Catherine-street*.
- Oct. 29, 1855 Wilks, William George, 1, *Dale-st.*, and *Mill-bank, Anfield*.
- April 7, 1862 Willans, Thomas H., 82, *Rodney-street*.
- Nov. 18, 1861 Williams, Charles Wye, A.I.C.E., *The Nook, St.*
James' Mount.
- Mar. 18, 1861 Wood, Geo. S., *Belle-vue-road, Wavertree*, and 20, *Lord-st.*

HONORARY MEMBERS.

LIMITED TO FIFTY.

- Nov. 6, 1812 Peter Mark Roget, M.D. Edin., F.R.C.P., F.R.S., F.G.S.,
F.R.A.S., F.R.G.S. &c., 18, *Upper Bedford-place*,
London.
- Feb. 12, 1819 John Stanley, M.D. Edin., *Whitehaven*.
1827 Rev. William Hincks, F.R.S.E., F.L.S., Professor of
Natural History in University College, *Toronto*,
C. W.
- Dec. 5, 1828 Rev. Brook Aspland, *Dukinfield, Cheshire*.

- Jan. 4, 1833 The Right Hon. Dudley Ryder, Earl of Harrowby, K.G., D.C.L., F.R.S., *Sandon-hall, Staffordshire, and 39, Grosvenor-square, London, W.*
- Jan. 4, 1833 James Yates, M.A., F.R.S., F.L.S., F.G.S., &c., *Lauderdale House, Highgate, London.*
- †April 12, 1833 Thomas Stewart Traill, M.D., Edin. F.R.C.P.E., F.R.S.E., F.G.S., &c., Professor of Medical Jurisprudence in Univer. Edin., *Edinburgh.*
- †Jan. 2, 1835 John Ashton Yates, F.R.G.S., *Bryanston-square, London.*
- Jan. 2, 1835 George Patten, A.R.A., 21, *Queen's-road West, Regent's park, London.*
- May 1, 1835 William Ewart, M.P., *Cambridge square, Hyde-park, London.*
- Nov. 2, 1835 The Right Hon. Lord Brougham and Vaux, M.A., D.C.L., F.R.S., Chancellor of the University of Edinburgh, 4, *Grafton-street, London, W., and Brougham Hall, Penrith.*
- Feb. 20, 1837 The Most Noble William, Duke of Devonshire, K.G., M.A., F.R.S., F.G.S., &c., Chancellor of the Univer. of Cambridge, *Devonshire House, London, W., and Chatsworth, Derbyshire.*
- Nov. 12, 1838 Geo. Biddell Airy, M.A., D.C.L., F.R.S., Hon. F.R.S.E., Hon. M.R.I.A., V.P.R.A.S., F.C.P.S., &c., Astronomer Royal, *Royal Observatory, Greenwich.*
- Feb. 24, 1840 James Nasmyth, F.R.A.S., *Penshurst, Kent.*
- Nov. 2, 1840 Richard Duncan Mackintosh, L.R.C.P., *Exeter.*
- Nov. 15, 1841 Charles Bryce, M.D., Glasg., Fell. F.P.S.G., *Brighton.*
- Oct. 21, 1844 J. Beete Jukes, M.A., F.R.S., M.R.I.A., F.G.S., Local Director of the Geological Survey of Ireland, 51, *Stephen's-green, Dublin.*
- Oct. 21, 1844 T. P. Hall, *Coggeshall, Essex.*
- Oct. 21, 1844 Peter Rylands, *Warrington.*
- Oct. 21, 1844 John Scouler, M.D., LL.D., F.L.S., *Glasgow.*
- Oct. 21, 1844 Thomas Rymer Jones, F.R.S., F.Z.S., F.L.S., Professor of Comparative Anatomy, *King's College, London.*
- Oct. 21, 1844 Robert Patterson, F.R.S., M.R.I.A., *Belfast.*
- Oct. 21, 1844 Professor Alger, *Boston, U.S.*
- Oct. 21, 1844 Sir Charles Lemon, Bart., M.A., Cantab., F.R.S., F.G.S., *Penrhyn, Cornwall.*

- 1844 William Carpenter, M.D., Edin., F.R.S., F.L.S., F.G.S.,
Registrar London University.
- 1847 Sir William Rowan Hamilton, LL.D., Hon. F.R.S.E.,
M.R.I.A., F.R.A.S., F.C.P.S., Astronomer Royal for
Ireland, *Dublin.*
- Nov. 26, 1848 Rev. Thomas Corser, M.A., *Strand, Bury.*
- Jan. 8, 1850 Rev. St. Vincent Beechy, M.A., Cantab., *Worsley, near
Eccles.*
- Jan. 27, 1851 James Smith, F.R.S.S.L. and E., F.G.S., F.R.G.S., *Jordan-
hill, Glasgow.*
- Feb. 24, 1851 Henry Clarke Pidgeon, *London.*
- Feb. 24, 1851 Rev. Robert Bickersteth Mayor, M.A., Fell. St. John's
Coll. Cantab., F.C.P.S., *Rugby.*
- Jan. 26, 1852 William Reynolds, M.D., *Coed-du, Denbighshire.*
- Oct. 17, 1853 Rev. James Booth, LL.D., F.R.S., &c., *Stone, near
Aylesbury.*
- Feb. 23, 1857 Thomas Jos. Hutchinson, F.R.G.S., F.R.S.L., F.E.S.,
H.B.M. Consul, *Fernando Po.*
- Oct. 15, 1860 William Brown, Col. 1st L.A.V., *Richmond-hill, Liverpool.*
- Nov. 4, 1861 Louis Agassiz, Professor of Natural History in Harvard
University, *Cambridge, Massachusetts.*
- Nov. 4, 1861 William Fairbairn, LL.D., C.E., F.R.S., *Polygon, near
Manchester.*
- Nov. 4, 1861 Rev. Thomas P. Kirkman, M.A., F.R.S., *Croft Rectory,
Warrington.*
- Feb. 24, 1862 The Right Rev. H. N. Staley, Bishop of Honolulu,
Sandwich Islands.

ASSOCIATES.

LIMITED TO TWENTY-FIVE.

- Dec. 2, 1861 Captain James Anderson, R.M.S.S. "China," Cunard
Service, 34, *Richmond-terrace, Everton.*
- Jan. 27, 1862 Captain John H. Mortimer, late of the American Ship,
"Florida."
- Mar. 24, 1862 Captain P. C. Petrie, "City of New York," Commodore
of the Inman Line of American Steam Packets, 15,
Church-street, Everton.

TREASURER'S ACCOUNTS, 1860-61.

Dr. *Literary and Philosophical Society, in Account with Isaac BIELEY, Treasurer, to October, 1861.* Cr.

| | £ | s. | d. | £ | s. | d. |
|--|------|----|----|--------------------------------|------|---------|
| To paid Brakell for Printing "Proceedings" | 87 | 8 | 6 | | | |
| " Subscription to Mr. Brown's Address | 8 | 3 | 0 | Dock Bond..... | £150 | 0 0 |
| " Printing for Printing | 17 | 1 | 9 | " In Treasurer's hands..... | 37 | 2 9 |
| " Management:— | | | | | | 187 2 9 |
| Distribution of Circulars and Proceedings; } | | | | " Subscriptions (Annual) | | 92 8 6 |
| Miscellaneous Correspondence; additional } | 15 | 1 | 0 | Do. (Arrears) | | 0 0 0 |
| rs; Incidentals | | | | " Entrance Fees | | 7 7 0 |
| " | 10 | 10 | 0 | " Interest on Dock Bond | | 5 16 4 |
| " | 11 | 4 | 0 | " Transactions sold | | 1 15 0 |
| " | 2 | 5 | 0 | | | |
| " Waiter's Attendance | 0 | 5 | 6 | | | |
| " Lockemith's Bill for Bookcase | 2 | 8 | 6 | | | |
| " Balance due to Dr. Thomson | 1 | 0 | 0 | | | |
| " Carriage of Box from Royal Observatory | 4 | 10 | 0 | | | |
| " Collector's Commission | £154 | 17 | 3 | | | |
| | 145 | 19 | 4 | | | |
| To Balance carried down..... | £300 | 16 | 7 | | | |
| | | | | Balance brought down— | | |
| | | | | Dock Bond..... | £150 | 0 0 |
| | | | | Due to Treasurer | 4 | 0 8 |
| | | | | Exclusive of Arrears | £145 | 10 4 |

October, 1861. *Errors Excepted.*

Audited and found correct,

J. C. REDISH, }
CHARLES CLARE, } AUDITORS.

. . .

PROCEEDINGS
OF THE
LIVERPOOL
LITERARY AND PHILOSOPHICAL SOCIETY.

ANNUAL MEETING—FIFTY-FIRST SESSION.

ROYAL INSTITUTION, October 7th, 1861.

10 **REV. H. H. HIGGINS, M.A., PRESIDENT**, in the Chair.

The minutes of the last meeting having been read and
ed,

he **PRESIDENT** congratulated the Society upon its meeting
her to inaugurate the Session,—a Session which would be
kable for containing the fiftieth anniversary of the
y's birth.

SECRETARY then read the following Report from the
l :—

o previous period of the existence of the Literary
osophical Society has it evinced greater vitality, or a
mising activity than at the present. It this day enters
fiftieth year of its existence, but instead of a decay
ction, it manifests signs of a rejuvenescence and
rength which cannot fail to be most pleasing and
to all who take an interest either in the advance-
rature and science, or in the primitive institutions

of Liverpool. The fiftieth anniversary of the day on which Roscoe, Rathbone, Traill, and others met together to found a society which was long to be the nucleus of the scientific men of Liverpool, will arrive on the 21st day of February next; and how so interesting and important an event in the annals of the town may be duly celebrated, will form a subject for the careful deliberations of your Council. There still remain amongst us some who were present at the first meeting, two of whom, Mr. Wm. Rathbone, and Mr. James Houlbrooke Smith, have remained continuous subscribing members up to the present time, and two others, Dr. Traill, now of Edinburgh, and Mr. John Ashton Yates, now of London, have been, for half that period, upon our corresponding list. During the last fifty years the Literary and Philosophical Society has passed through various vicissitudes, and undergone some severe shocks; but it has bravely withstood them all. For the last sixteen years it has annually published its Proceedings, and the volume for the past session, which has been already a month in the hands of the members, abundantly testifies that the communications laid before the Society at the present time do not yield in interest or importance to any that have formed the matter of its deliberations in times gone by.

An examination of the lists of members printed in the volumes of past years shows that the average number of ordinary members of the society has been about 143. But while the present number is slightly below that average, that fact should serve to stimulate the Society to the enrolment of fresh members. The circumstance, however, that, during the past session, twenty new members have been elected, many of them young and diligent labourers in the fields of literature and science, proves that we may expect much from the infusion of new spirit into the Society, and renders further accessions a matter of high probability. During the past session, eleven members left us by resignation and removal, and two of the

most venerable were removed by death,* so that at present the *role* of ordinary members contains 187 names.

In the death of Mr. Richard Rathbone the society has lost another link of the chain which united it to its founders of a previous generation, for he was an original member of the Society, and was, up to his lamented decease, a *subscribing* member. For true kindness of heart, and for the disposition to do with the beneficent hand that which the benevolent heart dictated, no one could excel him. He was well known as a staunch supporter of the School for the Deaf and Dumb, in the foundation of which he used great influence; and, indeed, his untiring zeal and self-devotion in the cause of humanity and charity, made him widely known and highly esteemed, though he himself appeared but little in public. He died, after a short illness, on Saturday, November 10th, 1860, at his residence, Woodcote, aged 72. The other loss which the Society has sustained was that of Mr. Richard Brooke, F.S.A., who had been a member since 1855. For many years an active member of the legal profession, he devoted his retired leisure to the study of the history and antiquities of his country; and several of the latter volumes of our Proceedings contain papers on such subjects from his pen. He was a member of your Council up to the time of his death, which took place on the 14th of June, 1861, in his 70th year.

The list of Corresponding Members, limited to fifty, has been carefully revised, and contains at present thirty-five names, that of Mr. William Brown having been added during the past session. This list is open, therefore, to important

* Since the above was written, only ten days ago, death has been busy in our ranks, and three of our members have fallen. The Rev. Arthur Ramsay, M.A., of West Derby is the first of these; immediately after, a lamentable accident deprived of life Mr. Joshua Walmsley, the respected bookseller of Lord-street; and the past week has carried off with it Mr. Alexander MacIlveen, Principal of the Liverpool Institute. These gentlemen had all been members for some years past, but rarely attended the meetings. Another recent death, that of Mr. James Atkin, 190, Grove-street, has also been announced.

additions, and recommendations to that effect will shortly be laid before you.

The Treasurer will present his balance-sheet, from which it will be seen that the subscriptions of the members have sufficed to carry out the legitimate objects of the Society, without the necessity of entrenching upon the reserve fund of £150, which is invested in the security of a Dock Bond ; nevertheless, accessions to the ranks of subscribing members are highly desirable.

During the past session there has been no lack of communications laid before the Society, nor of interest in the discussions. At the same time, it has not been necessary to resort to any unusual stimulus in order to elicit these proofs of its activity. At the close of the session, however, it was thought desirable that the members should meet in a social and festive manner, and a very successful dinner was arranged by a committee appointed for that purpose. At that dinner, which took place at the Childwall Abbey Hotel, forty-seven gentlemen were present, your President occupying the chair, and supported by the Worshipful the Mayor, as a guest.

The recent meeting of the British Association at Manchester was attended by a deputation representing this Society, and consisting of several of its chief officers.

At the last annual meeting you were called upon to elect five delegates to represent the Society in the management of the Gallery of Inventions and Science. These delegates have as yet little to report. The building has been roofed in, and the fittings are in progress ; but with respect to the ultimate destination of the gallery, and the object for whose reception it was intended, no steps have yet been taken.

During the past session your Secretary has communicated with most of the societies to which your Proceedings have been sent, with a view to secure a suitable exchange of volumes. In most cases a satisfactory response has been obtained, and

several valuable donations have resulted ; in addition to which, your society has been placed upon the list of those to which their Proceedings are regularly sent, by several societies which did not previously communicate with us. It has been the wish of your Secretary to improve the library, and render it available to the members, the great difficulty in the way of such improvement being the insufficient space at command for the display of the volumes. Could more accommodation be obtained, a catalogue might be usefully drawn up, and the books, chiefly those for reference, would be, no doubt, much more in request by the members.

The present session opens in a manner which promises excellently for the activity and reputation of the Society. A great many papers are already promised, almost sufficient, in fact, to occupy the whole of the meetings ; the subjects being neither exclusively scientific nor literary. A proposal will also be made to you to extend the usefulness of the Society by making provision for a new class of members to be styled Associates. The object of this measure is to place ourselves in a position to hold out encouragement and honorary distinction to those masters of vessels and persons similarly situated, who may prove themselves anxious to make a good use of the rare opportunities they possess of advancing science by the intelligent collection of natural objects in various parts of the globe, or of making observations in meteorology, astronomy, &c., in remote regions of the earth, such as cannot fail to be of benefit to science in general, no less than to their own profession. This is but a step towards the maturity of a scheme brought by your Secretary before the British Association at Manchester, and which received the sanction of that body, by the appointment of an influential committee to report upon the subject. It may be added that a similar movement is contemplated by one of the largest and most important scientific societies in London.

Although new societies, having for their objects some of those meditated by this Society, are constantly springing up, we have reason to believe that it is neither their object nor their effect to weaken or to detract from the parent Society from which they have all sprung. Two such societies have lately arisen, one of which, the Naturalists' Field Club, has flourished like an infant Hercules. The Literary and Philosophical Society, while it is not anxious to see an undue multiplication of such societies, at the same time wishes to welcome them as labourers in the same field as itself. As the oldest society, its scope embraces the range of literature and science, and it may be regarded as a sign of the advance of both, and of the increase of their cultivators, that the investigators of subordinate departments of knowledge should resolve themselves into special Societies, for the cultivation of their favourite field of research. Such is the history of all scientific communities ; and while, on the one hand, the advance from the general to the particular is a sign of progress, on the other, the gradual infusion of the scientific element into the mass of the mercantile community cannot fail to prove ultimately useful. Without it, Liverpool would appear open to the charge of being a community whose sole object is the accumulation of money ; but from this charge it is relieved by the existence of numerous scientific and literary societies, whose influence is silent but powerful, and which may truly be called the salt of the town.

In conclusion, and in accordance with the laws of the Society, the retiring Council recommend the following five gentlemen as members of the new Council to be elected this evening ; namely, the Rev. W. Banister, Thomas Dobson, Rev. C. D. Ginsburg, Charles Spence, David Walker, M.D.

H. H. HIGGINS, M.A., President.

CUTHBERT COLLINGWOOD, M.B., Hon. Sec.

It was moved by Mr. J. C. REDISH, and seconded by the Rev. H. J. HINDLEY, and carried unanimously, "That the Report now read be adopted, and printed in the Proceedings of the Society."

The Treasurer having read his balance-sheet, it was moved by Mr. CLARK, and seconded by Mr. MORTON, and carried unanimously, "That the accounts now presented be passed."

The Society then proceeded to ballot for a Council and officers for the ensuing year, with the exception of the President, whose term of office does not expire till October, 1862.

The ballot was first taken for five new members of Council, who were not on the Council of the past year, when the following gentlemen, who were recommended by the Council, were elected :—

Rev. W. Banister, B.A., Thos. Dobson, B.A., Rev. C. D. Ginsburg, Charles Spence, and David Walker, M.D., F.L.S.

In addition to these, the following nine gentlemen were re-elected from the retiring Council :—

I. Byerley, F.L.S., O. Collingwood, M.A., F.L.S., J. B. Edwards, Ph.D., F.C.S., William Ihne, Ph.D., T. J. Moore, Corr. Mem. Z. S., J. Birkbeck Nevins, M.D., G. H. Morton, F.G.S., Charles Clark, Rev. J. Robberds, B.A.

A ballot was finally taken for office-bearers, with the following result :—

President :

[The REV. HENRY H. HIGGINS, M.A.Cantab.]

Vice-Presidents :

WILLIAM IHNE, Ph.D.

J. BIRKBECK NEVINS, M.D. (London.)

J. BAKER EDWARDS, Ph.D., F.C.S.

Treasurer :

ISAAC BYERLEY, F.L.S., F.R.C.S.

Hon. Secretary :

CUTHBERT COLLINGWOOD, M.A. and M.B. (Oxon), F.L.S., &c.

The Treasurer and Secretary were re-elected by acclamation.

Five members were then balloted for to represent the Society in the Committee of Management of the Gallery of Inventions and Science, when the delegates of the past year were re-elected; namely, Rev. H. H. Higgins, President; Dr. Nevins, Vice-President; Dr. Collingwood, Hon. Sec.; Mr. A. Higginson, and Mr. Duckworth.

The Society then proceeded to consider the following recommendations of the Council; first—

“That the annual meeting of the Council take place fourteen days previous to the annual general meeting, instead of seven days, as heretofore.”

This being a mere matter of detail and convenience, was at once passed. The other recommendation was more important; namely—

“That a law be passed, empowering the Society to elect as ASSOCIATES, masters of vessels, and others engaged in marine pursuits, who may have peculiar facilities for adding to the scientific interest of the Society's proceedings; such Associates to be in every case recommended by the Council, and subject to annual re-election. The Associates to have the same privileges as Corresponding Members, and their number to be limited to twenty-five.”

Dr. COLLINGWOOD, in moving this resolution, explained its objects, which had already been referred to in the Report; and, having been seconded by the Rev. J. ROBBERDS, it was, after much discussion, carried unanimously. These recommendations to be confirmed at an Extraordinary Meeting to be held after the next ordinary meeting.

Numerous donations to the Library were laid upon the table, a list of which will be found in the Appendix.

The PRESIDENT wished it to be known that the greatly increased number of the volumes presented was mainly owing to the activity of the Hon. Secretary, who was doing his best to put the Library into an efficient condition.

FIRST ORDINARY MEETING.

ROYAL INSTITUTION, October 21st, 1861.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

Numerous donations to the Library were laid upon the table.

Mr. JAMES YATES exhibited some specimens of manganese in sandstone, from Toxteth-park.

Dr. IHNE quoted some remarks from the German *Zeitschrift für Allgemeine Erdkunde*, 1861, from the pen of the eminent African traveller, Dr. Barth, in which he enters into the question of the explorations of M. du Chaillu, and comes to the conclusion "that M. du Chaillu, is not only extremely inaccurate in his statements and descriptions, but that a considerable portion of his travels is mere fiction."

A brief discussion ensued upon the merits of M. du Chaillu's stories of the Gorilla, the President noticing the objections of Mr. Waterton, which, in his opinion, were of great weight.

Mr. MOORE said that a young living Gorilla had been once in Liverpool, and was very tame and docile. This specimen is now in the museum of Mr. Waterton.

Dr. COLLINGWOOD said that, being personally acquainted with all parties in the controversy, he had taken great interest in it. On his first acquaintance with M. du Chaillu, he had felt disposed to give him credit as an unassuming and truth-telling observer; but he could not blind himself to the fact that serious objections had been urged against his statements, which had not yet been satisfactorily met and answered.

Mr. MOORE described a monster aquarium, now exhibiting at Boston, in which had been for some months past a living whale of the white species (Beluga), 12 feet long, as well as a dolphin, shark, and other fishes. This unique aquarium was of glass, one inch thick, polygonal, and twenty-five feet in diameter. The purity of the water was preserved by pumping in sea-water at the rate of six hundred gallons per minute, which was effected by a steam-engine of seven-horse power. Besides this great tank, nearly sixty other smaller tanks were in the exhibition, which is visited by an average of two thousand persons daily.

Mr. MOORE also exhibited living specimens of the North American king-crab (*Limulus*) presented to the Museum by Professor Agassiz, of Boston, and brought over by the kind offices of Captain Anderson, of the Cunard steamship *Europa*. Also, a most magnificent specimen of the Trilobite, *Paradoxides Harlani*, from the Braintree limestone, twelve miles from Boston. This rare and beautiful specimen measures $13\frac{1}{2}$ inches in length, by 8 inches in breadth, and is not excelled by more than one or two known specimens. It was presented to the Museum by Mr. Wainwright, of Boston, and formerly of Liverpool.

Dr. COLLINGWOOD remarked that the exhibition now before the society was peculiarly interesting, inasmuch as there was one of the finest known specimens of the most ancient Trilobite, for ages and ages an extinct animal, and they had also before them living specimens of its nearest representative in modern times, the *Limulus*, or king-crab ; a combination of which any society might justly feel proud.

The following additions to the Fauna, made during the *past year*, by Dr. COLLINGWOOD, Dr. WALKER, and Mr. MOORE, were announced :—

SOBEX REMIFER—(Oared shrew).—Seacombe. I. Byerley.

MOLLUSCA.

FUSUS ISLANDICUS.—A dead shell picked up at New Brighton. C. C.

PHOLAS DACTYLUS.—One valve dredged ; off N. W. light ship. D. W.

SYNDOSMYA INTERMEDIA.—Off Hoylake. D. W.

PHILINE APERTA.—In considerable numbers off N. W. light ship. C. C.

CRUSTACEA.

HYAS COARCTATUS.—Not uncommon. T. J. M.

PORTUNUS MARMOREUS.—Not uncommon—dredged off Leasowe. C. C.

More common off N. W. light ship. D. W.

PORTUNUS HOLSATUS.—Rare, only one large specimen found off Hoylake. D. W.

GALATHEA ANDREWSII.—A few specimens. D. W.

G. NEXA ?—I am inclined to think I have one or two specimens. D. W.

PALEMEN VARIANS.—D. W.

MYDIA CHAMELEON.—New Brighton. D. W.

DIASTYLUS RATHKII.—One Specimen off N. W. light ship. C. C.

GAMMARUS OTHONIS.—D. W.

G. GRACILIS.—D. W.

G. SABINI.—D. W.

AMPHITHOE DUBIA.—N. W. light ship. D. W.

EUBYDICE PULCHRA.—Abundant in the Dee. C. C.

Off New Brighton. D. W.

ANNELIDA.

PLANARIA — ;—The large Planaria of the *Fauna* again taken ;
N. W. light ship. C. C.

ECHINODERMATA.

OPHIOCOMA FILIFORMIS.—Two taken. N. W. light ship. D. W.

ASTERIAS AURANTIACA.—I. Byerley.

ECHINUS FLEMINGII.—Off N. W. light ship. D. W.

ACALEPHÆ.

VELELLA SPIRANS.—Southport sands. One. C. C.

Mr. Moore has received specimens of the following rare and remarkable Asterians from off Fleetwood.

COMATULA (ROSACEA ?)—About twenty specimens, seven inches in diameter.

PALMIPES MEMBRANACEUS.—One specimen.

The following list of new plants and new localities was also submitted:—

PHANEROGAMIA.

RESEDA PHYTEUMA.—Ballast heaps, Garston. (Alien.) T. Gibson, senr.

TRIGONELLA ORNITHOPODIOIDES. (Linn.)—West Kirby. H. S. Fisher.

MIMULUS LUTEUS. (Wild.)—Birkdale Sand Hills, abundant; (naturalised). H. S. F.

CHENOPODIUM RUBRUM. (Linn.)—Claughton. H. S. F.

ANTENNARIA DIOICA. (Linn.)—Birkdale Sand Hills, abundant. H. S. F.—New Brighton. Mrs. F. Boulton.

TRAGOPOGON PORRIFOLIUS. (Linn.)—Railway banks at Walton. H. S. F.

LEONURUS CORDIACA.—Rainford Village. T. G.

GALEOPSIS VERSICOLOR. (Curt.)—Plentiful at Simon's Wood.

ORCHIS PYRAMIDALIS. (Linn.)—Sandy Fields, near Hoylake. F. W.

GYMNADENIA CONOPSEA. (Rich.)—Meadow at Arrow. T. Holden.

PYRUS TERMINALIS. (Crantz.)—The tree mentioned in "Hall's Flora" is still in existence at "Knot's Hole," Dingle Shore. July, 1861. F. Webb.

MENCHIA ERECTA. (Ehrh.)—West Kirby. H. S. F.

CERASTIUM ARVENSE. (Linn.)—Hilbre Island. T. G.

STELLARIA GLAUCA. (With.)—Ditches, Southport. T. G.

HABENARIA ALBIDA. (Rich.)—Bromborough. Mr. Hatcher.

NEOTTIA NIDUS-AVIS. (Rich.)—Wood at Ince Blundell. Miss S. Dowie.

CAREX STRICTA. (Good and Smith.)—Wood at Ormsirk. T. Williams.

POLYPODIUM PHEGopteris.—Side of a lane on the road to Heswell Hill, from Claughton. Miss C. Grundy.

LIABIA TRIPHYLLA.—Near the College, Claughton. (Alien.) Mrs. F. Boulton.

SAPONARIA VACARIA.—On the new roads at Claughton. (Alien.) Mrs. F. Boulton.

ROSA INVOLUTA. (Sm.)—Hedge at Bromborough. H. S. F.

ROSA CINNAMOMEA. (Linn.)—Hedge at Ormsirk. T. Williams.

FRAGARIA ELATIOR. (Ehrh.)—Ince Woods, abundant. H. S. F.

DIANTHUS DELTOIDES. (Linn.)—Three fields below West Kirby Church. F. W.

PLANTAGO MEDIA. (Linn.)—Meadow at Oxtown. Mrs. F. Boulton. Walton, near the Prison. W. Harrison.

CHRYSOSPLENIUM ALTERNIFOLIUM. (Linn.)—Was found in Cheshire by Miss Grundy; but the exact locality is not known; supposed to be near Raby.

GERANIUM PHÆUM. (Linn.) — Wood at Ince Blundell. Miss S. Dowie.

RANUNCULUS AQUATILIS (VAR. **CONFUSUS**). (Gr. and Go.)—Wallasey Pool. H. S. F.

ANAGALLIS CÆRULEA.—Claughton. Miss C. Grundy. Rainhill. H.H.H. Variety, with pink flowers, at Claughton.

MELILOTUS PARVIFLORA. (Desf.)—New roads where ballast has been placed at Claughton. (Alien.) Mrs. F. Boulton.—New road, Prince's Park. Miss C. Grundy.

MELILOTUS LEUCANTHA. (Koch.)—With the last. Mrs. F. Boulton.

TRIGONELLA FÆNU-GRÆCUM.—Same locality. (Alien.) Mrs. F. Boulton.

TRIGONELLA CORNICULATA.—Same place, rare. (Alien.) Mrs. F. Boulton.

TRIGONELLA PROSTRATA. (Koch.)—With the above, rare. (Alien.) F. W.

ASPHODELUS FISTULOSUS.—Abundant on the new roads at Claughton. (Alien.) Mrs. F. Boulton.

MUSCI.

GYMNOSTOMUM CURVIROSTRUM.—The Red Noses. F. P. Marrat.

HYPNUM DISPALLATUM. (Wils. MSS., new species.)—On the Chester road, near the bridge, crossing Bromborough Pool. F. P. M.

FUNGI.

ARCYRIA NUTANS (Fries.)—Rainhill Hall, Sept., 1861. H. H. Higgins.

"This species is much more rare, and scarcely less beautiful than *Arcyria punicea*, Sow; indeed nothing can exceed the elegance of a tuft of this fungus after it has acquired its drooping character."—Greville. Scot. Crypt. Flor.

CLAVARIA —,—Supposed to be undescribed. Quite simple, 3 inches high, pale, clay-coloured, apex very obtuse, much attenuated below, contorted or abruptly bent, pileus somewhat distinct from stem. On the bare clay, banks of the Mersey, above New Ferry, Sept., 1861. H. H. H.

A paper was then read, of which the following is an abstract:—

ON THE EXCESS OF WATER IN THE REGION
OF THE EARTH ABOUT NEW ZEALAND :
ITS CAUSES AND ITS EFFECTS.

By JAMES YATES, M.A., F.R.S., F.L.S., F.G.S.,

Member of the Manchester Geological Society,

HONORARY MEMBER.

IN the earlier part of the last century an idea prevailed that there must be a great continent about the South Pole, capable of balancing the large tract of dry land which surrounds the North Pole. Captain Cook (A.D. 1772) and other navigators were sent on voyages of discovery to ascertain this fact ; but nothing of the kind was brought to light, and no land has ever been discovered in sufficient mass to correspond with the great extent of land in the Northern Hemisphere. I propose to inquire whether the equipoise may not be found in another way, namely, under the surface of the earth. I think it probable, that the half of the earth to which New Zealand belongs is heavier than the opposite hemisphere ; and it will be my endeavour to explain the grounds of this supposition, and to follow it into its consequences.

Geographers were formerly satisfied with the observation that the ocean is vastly more extensive about the South than about the North Pole. Recently they have stated the fact with much greater accuracy. Berghaus, in his Physical Atlas, exhibits the earth divided into two hemispheres on this principle—one, called the land hemisphere, contains nearly all the dry land, whilst the other, called the water hemisphere, consists almost entirely of water. The centre of the aqueous portion is marked by the meridian of 170° West longitude from Paris, where it intersects the parallel of 40° South latitude.

The mountains rise to a far greater elevation above the surrounding seas in the land, or European, than in the water, or New Zealand hemisphere. This will appear from the subjoined tables. The first contains the heights of ten conspicuous mountains in the land hemisphere, chosen, as much as possible, from remote parts of that hemisphere; the second includes ten mountains, chosen, in like manner, from remote parts of the water hemisphere, and equally remarkable for their superior elevation. The two columns being added up, the amounts show at a glance the comparative average elevation of the two sets of mountains, viz., 5,524 metres for the one, and 3,604 for the other.

MOUNTAINS IN THE LAND HEMISPHERE.

| | |
|--|--------------|
| Deodunga, Himalaya | 8748 metres. |
| Aconcagua, Chili | 7314 |
| Kilimanjaro, Equatorial Africa | 6095 |
| Elbrouz, Caucasus..... | 5646 |
| Popocatepetl, Mexico | 5400 |
| Mount St. Elias, Rocky Mountains | 5113 |
| Mont Blanc, Europe..... | 4810 |
| Klieutschewsk, Kamschatka..... | 4804 |
| Teneriffe, Atlantic Ocean..... | 3710 |
| Wrangell's Volcano, Coppermine R. | 3600 |
| | — 55240 |

MOUNTAINS IN THE WATER HEMISPHERE.

| | |
|-------------------------------------|--------------|
| Singalang, Sumatra | 4570 |
| Mowna Kia, Sandwich Islands | 4252 |
| Mount Terror, South Victoria | 4232 |
| Tobreonou, Otaheite | 3725 |
| Semeru Gunong, Java | 3720 |
| Fusi-no-yama, Japan..... | 3710 |
| Alaid, Kurile Islands | 3648 |
| Mount Ambotismene, Madagascar | 3507 |
| Mount Egmont, New Zealand..... | 2700 |
| Mount Kosciusko, Australia | 1976 |
| | — 36040 |
| Difference in average height | <u>19200</u> |

In addition to the two principal facts which I have now stated, viz., the great excess of water in the region around New Zealand, and the greater elevation of the mountains in the opposite hemisphere, geographers have also endeavoured to make an accurate comparison between the extent of the earth's surface covered with water, and the surface which is left dry.

Professor Rigaud, by weighing the land and water portions of the paper gores which are used to cover terrestrial globes, made the proportion of land to water to be 100 to 270.

As the determination of the proportion of land to water was the chief object of Cook's second voyage, it necessarily engaged the attention of his companions, and especially of the celebrated John Reinhold Forster, who was appointed to the office of Naturalist to the expedition. Accordingly, in his volume of "*Observations made during a Voyage round the World*," (London, 1778,) he states, that they had not been able to discover land "sufficient to counterpoise the lands of the Northern Hemisphere," and adds, "I am, therefore, apt to suspect that nature has provided against this defect by placing, perhaps, at the bottom of the Southern Ocean such bodies as by their specific weight will compensate the deficiency of lands, if this system of the wanted counterpoise be at all necessary. But there may, perhaps, be other methods to obviate this defect, of which our narrow knowledge, and experience have not yet informed us."

Forster's idea of a counterpoise at the bottom of the Southern Ocean does not appear to have attracted the least attention. On the contrary, those who have attempted a solution of the problem seem to have directed their attention entirely to the opposite hemisphere, and have had recourse to the action of internal forces, which are supposed to have raised the continents above the sea level in the land hemisphere. Mr. Petermann says, in his *Atlas of Physical*

Geography—"The preponderance of land in the Northern Hemisphere indicates the superior intensity of the causes of elevation in Northern latitudes at a remote geological epoch."

Sir John Herschel gives the following solution :—"The fact" of the existence of two hemispheres, the one chiefly land, the other almost entirely water, in the words of this author (p. 15), "proves the force by which the continents are sustained, to be one of *tumefaction*, inasmuch as it indicates a situation of the centre of gravity of the total mass of the earth somewhat eccentric relatively to that of the general figure of the external surface—the eccentricity lying in the direction of our antipodes—and is, therefore, a proof of the comparative *lightness* of the materials of the terrestrial hemisphere."

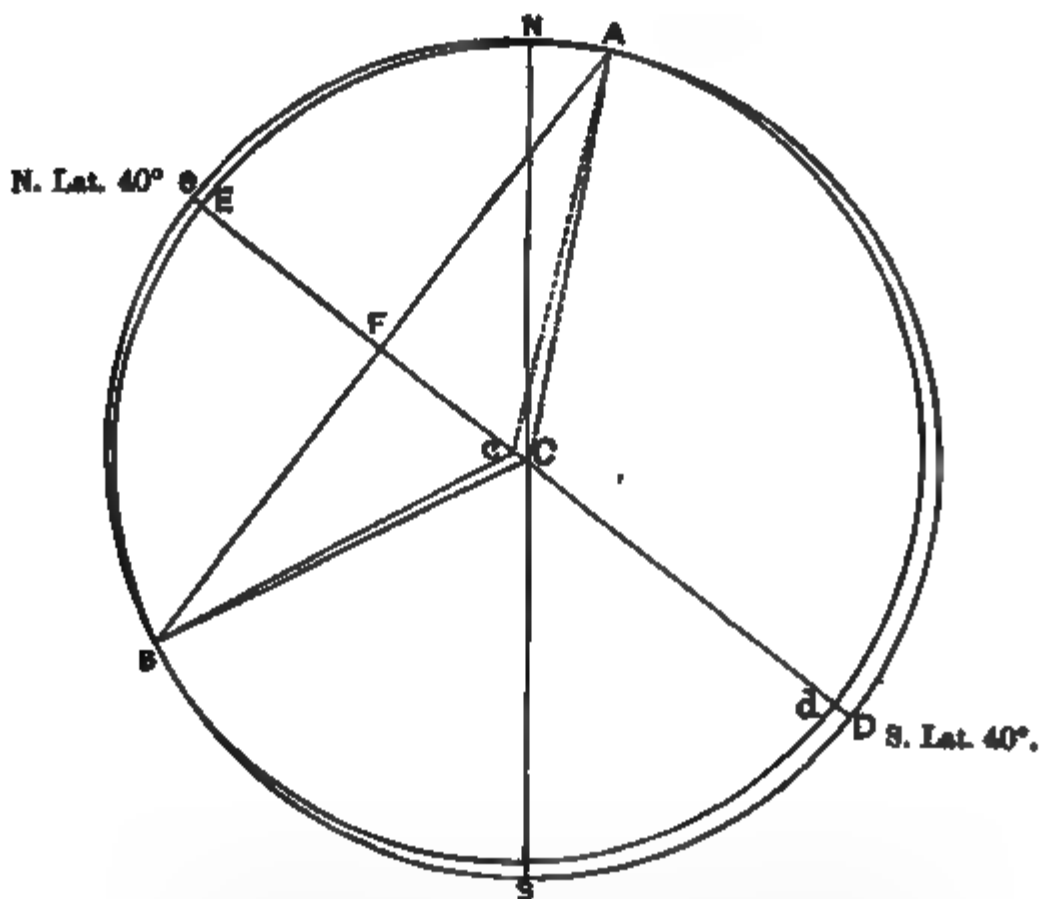
It appears to me that this theory, though partly true, is not entirely supported by facts, and does not reach the requirements of the case. Confining ourselves to Europe, we know, that if the coast of Sweden has been gradually rising by the swelling of substances beneath it, the coasts of Holland, Belgium, the North of France, and the opposite coasts of England, have been sinking. The temple of Serapis, at Puzzuoli, is a well-known instance of the land rising and falling within a brief space of time. Thus the intumescence of some regions is balanced by the subsidence of others. But another mass of facts is furnished by Herschel himself in answer to his own theory. The passage which I have quoted is near the beginning of his highly valuable and interesting work, and at the end of the same volume he gives a "Table of the Heights of Mountains," classing them according to the usual great divisions of the earth, and distinguishing those which are now active volcanoes. From this list we learn that out of 465 mountains in the land hemisphere, 62 are volcanic, being rather more than one-seventh; whereas, in the water hemisphere, 66 in 109, or more than one-half, are active

volcanoes. It is also important to observe, and Sir John Herschel bears witness to the fact (p. 254), that earthquakes are no less frequent and violent in the water than in the land hemisphere.

If, then, earthquakes and volcanoes are evidences of "superior intensity of the causes of elevation," this cannot be the true explanation; for they abound in the one hemisphere, at least, as much as in the other. The only visible difference between the two hemispheres is that the mountains are much higher, and the tracts of dry ground much more extended in the land than in the water hemisphere.

To assist in arriving at a true solution of the problem before us, I shall now refer to a diagram.

IDEAL SECTION OF THE EARTH IN THE MERIDIAN OF NEW ZEALAND.



inner circle, $A c B d$, is the circumference of the solid earth, and c its magnitude; the greater circle, $A E B D$, is the circumference of the globe at the level of the ocean; C being the centre of gravity both of earth and of the ocean, and also the centre of magnitude of $A E B D$. c , and $E c$, are magnified about fifty times.

This diagram represents a section of the earth through the meridian of New Zealand, and shows the ocean partly encompassing the earth, and the atmosphere surrounding the whole. The letters N and S denote the North and South poles. The point C, which bisects the axis N S, is assumed to be the geometrical centre of the surrounding atmosphere, it being pre-supposed that both the atmosphere and the earth are spherical.

Besides the axis, another diameter is drawn from the point D, which is 40° from the Equator; in other words, it is drawn from the point where the meridian of New Zealand intersects the parallel of 40° south latitude. I believe that in fixing this point, Berghaus had the advice and co-operation of two of his fellow-citizens, who were indisputably pre-eminent as physical geographers, Alexander von Humboldt and Carl Ritter.

Having chosen this diameter D E, in conformity with Berghaus's computation, I suppose the ocean to extend to an equal distance on every side of it, and to thin off towards the chord A B, corresponding to the circle on the earth's surface, which would be the boundary of the ocean, if it were all collected into one uniform mass of water, instead of being ramified and distributed into oceans, seas, bays, and straits.

The determination of this chord A B is important, and may be made with sufficient accuracy for the purpose of the present inquiry on the grounds which I have already assumed in treating of the relative quantities of dry land and water. The arc A B is computed to be 123° , or nearly so.

If we endeavour to show why there is so great an excess of water in the south-eastern hemisphere, we may account for the fact in two ways. Either we may suppose that the solid earth is lower in all that portion—in other words, that a large mass is wanting to complete its sphericity, and that the space is

occupied by water instead of earth; or, secondly, we may suppose that the submerged hemisphere is heavier than the other, and attracts the water by its greater density. The first supposition is at variance with all the ideas hitherto received, and does not harmonize with what we know of the form of the other planets. I therefore think it unnecessary to dwell upon this hypothesis, and shall confine myself to the other.

The greater weight of the New Zealand hemisphere may arise from two causes—it may contain a greater proportion of igneous rocks and mineral veins, and the opposite hemisphere may contain a greater proportion of cavities filled with water.

From all we know of the crust of the earth, it is certain that its constituent parts are mingled together and interposed without any rule or law as to their specific gravities. We may therefore regard it as indisputable, that the two hemispheres are of unequal weight. The only questions are—Which preponderates over the other? where are the limits of the heavier portions to be found? and what effects may be ascribed to them? It appears to me, therefore, that there cannot be the slightest objection to the assumption that there is a greater abundance of mineral veins in that part of the earth which lies beneath New Zealand and the islands and seas surrounding it. Also beds of ironstone may be supposed to exist in superabundance throughout the same region, together with basaltic rocks, and others of high specific gravity.

On the other hand, the land, or European hemisphere, besides the inferior specific gravity of its mineral constituents, including more especially beds of coal, may abound in depressions, or in cavities filled with water. It is generally supposed that the waters of the Atlantic occupy a great valley, which divides the Old from the New World, and extends from pole to pole.

Its lowest depths have never been reached by soundings. According to Captain Maury, the greatest depths at which the

bottom of the sea has been reached with the plummet, are in the North Atlantic Ocean. But besides valleys, or hollows, on the surface, we have reason to believe that this hemisphere contains numerous and extensive cavities beneath the surface.

On the shore of Cephalonia is a considerable cascade of sea water, which, after turning a mill, pours itself in a constant stream into the bowels of the earth. Springs of fresh water, on the other hand, rise from the bottom of the Mediterranean sea in many places. The whole coast from Cette, in Languedoc, to Ruad, in Syria, may be said to be studded with these so-called "occhi." In the Carribbean sea so great a volume of fresh water rises to the surface, that ships go there for a supply, and the Manati, an amphibious fresh-water mammal, frequents the same spot. By land we have the mud-volcanoes of South America, the Geysers of Iceland, with innumerable hot springs at Bath and other places, and the clouds of steam issuing from Etna, Vesuvius, and other vents. All these facts prove, that whatever uncertainty there may be about the superabundance of heavy mineral masses on one side of the globe, there can be no denial of the existence of large and extensive cavities filled with water on the other. Hence, I assume as a fact, which, though not absolutely certain, is extremely probable, that the New Zealand half of the earth is heavier than the other half.

This assumption makes it further necessary to assume that the earth's centre of gravity c , differs from its centre of magnitude, and is situated in the diameter $D E$, on the side of the centre of magnitude, towards the part where the waters of the ocean are accumulated. It will be convenient to call the centre of magnitude of the earth, C . Then let C be taken as the centre of a circle which may represent the surface of the ocean. It is evident that this will be a greater circle than $A N B D$, the circle corresponding with the surface of the solid earth, because if the earth were perfectly spherical, as

we suppose for our present purpose, and if the ocean were equally attracted on every side, it would form a sphere of water surrounding the earth, and everywhere of equal depth. If, therefore, we take the supposed point C as a centre, and $CA = CB$ as radius, we shall describe a circle including the water hemisphere, and extending beyond the solid earth at d to D, being a distance a little greater than C c, which is the eccentricity of the earth's centre of gravity. The distance between D and d will be equal to the eccentricity, together with the difference between the two radii c A and C A.

On the other hand the distance between E and e will be equal to the eccentricity, minus the difference between the two radii.

$$\text{Or, } Dd = Cc + \overline{CA - cA} = 1920 \text{ metres.}$$

$$Ee = Cc - \overline{CA - cA}$$

We shall call the extremity of the radius, where it meets the surface of the solid earth, e.

We have thus obtained the arc of a second smaller circle, which is constructed upon the same chord A B with the larger circle, but which has c, the centre of magnitude of the earth, as its mathematical centre. This arc coincides with the surface of the earth where it rises above the ocean.

It will now be our object to compute the greatest distance between these two arcs at the opposite extremities of their common diameter, because the distance D d at the one extremity will probably agree pretty accurately with the greatest general depth of the ocean; and the distance E e will, in like manner, represent the greatest general elevation of the dry land above the sea level. Of the former, *i.e.*, the distance represented by D d, we may, I think, form a judgment from the elevation of the mountains above the ocean in the two hemispheres. We may use them as gauges, and, supposing the heights of mountains to have some approach to equality in both hemispheres, we may reason as follows:—

In the land hemisphere, the average elevation of the highest mountain masses is about 5524 metres; in the water hemisphere, 3604.* The difference between these two quantities is 1920 metres, which we may suppose to represent the general depth of the ocean. An ocean of this depth would be sufficient to submerge three-fourths of the solid earth, so as to leave the continents and islands rising above it, as they actually do. If some such quantity as this be taken as the ordinary depth of the ocean, it will follow, that when much greater depths are ascertained by soundings, these must be attributed to dislocations which have taken place at the bottom; they must be regarded as submarine seas, valleys, and lakes, analagous in their mode of formation to those which are found at the general level of the dry ground.

Reverting to our section of the earth, we may now observe, that, on the assumption of all the imagined circumstances on which the diagram is constructed, the points A B, and the small circle bisected by them, will be on the shores of the ocean, and will represent the water level, which will coincide with the whole surface of the ocean, provided that it is not subject to any local and disturbing attractions. Hence, the smaller arc, encompassing the dry ground, will be an excrescence or protuberance rising above the water level. Its greatest elevation will be represented by the distance between the two circles at the points E e, which will be equal to C c, the eccentricity before mentioned, minus the difference between the radii of the greater and smaller circles. It may be expected that this elevation should, in general, correspond with the elevation of the great areas of the continents, the separate mountains and ridges being regarded as the effects of local upheavals.

The general height of the land, E e, may be computed in different ways—1st, geometrically, by comparing the two

* See above.

circles which cut one another in A B, and have their centres in the same line ; 2ndly, by comparing the longest rivers on the face of the earth, and finding the height from which they descend in their navigable portion ; 3rdly, by taking measurements of the height of the continents and large islands above the level of the sea. The results of these three methods of investigation agree in a most remarkable manner. They give 600 metres, or nearly, as the greatest general height of the continents, and it appears certain that this elevation would be sufficient to discharge from the surface of the ground every shower falling from the atmosphere, and to convey its water to the ocean.

According to the view which I have endeavoured to explain, the eccentricity of the earth's centre of gravity is balanced by the attraction of the ocean to the water hemisphere, by which the centre of gravity of the earth becomes also the centre of gravity of the terraqueous globe. Also, the protuberance of the water on one side will make the centre of gravity of the terraqueous globe coincide nearly with its mathematical, or geometrical centre, which will be in the same diameter with the previously assumed centres. Again, when the atmosphere comes into action, its centre of gravity will coincide with the centre of gravity which has been already assumed—first, for the earth, and, secondly, for the terraqueous globe.

The original extra weight of the earth on one side will be balanced by the greater lightness of the water on the same side, and the ensuing extra weight of the terraqueous globe on the opposite side will be balanced by the greater lightness of the atmosphere on that side. The result will be, that the centre of gravity of the whole system will coincide, either altogether, or as nearly as can be conceived, with its geometrical centre, and this centre will determine its axis of rotation.

After the Ordinary Meeting, an EXTRAORDINARY MEETING was held for the purpose of confirming the proceedings of the last meeting in reference to the following recommendations of the Council :—

“ 1st. That the Annual Meeting of the Council take place fourteen days previous to the Annual General Meeting, instead of seven days, as heretofore.

“ 2nd. That a law be passed, empowering the Society to elect as ASSOCIATES, masters of vessels, or others engaged in marine pursuits, who may have peculiar facilities for adding to the scientific interest of the Society's proceedings ; such Associates to be in every case recommended by the Council, and subject to annual re-election. The Associates to have the same privileges as Corresponding Members, and their number to be limited to twenty-five.”

With respect to the second recommendation, Dr. COLLINGWOOD remarked that he had, since the last meeting, had an opportunity of conversing with Earl Granville, the Lord President of the Council, who approved of the scheme to which it referred. He had also procured a meeting in the Mayor's Parlour, at which several of the most influential shipowners of Liverpool were present, as well as the Chairman and Secretary of the Mercantile Marine Association, and Captains Anderson and Petrie. Mr. T. M. MACKAY, of the firm of James Baines and Co., presided, and having reported the nature and progress of the movement, the coöperation and approval of those present were obtained, and the path cleared for future progress.

The recommendations were then confirmed, and became Laws of the Society.

SECOND ORDINARY MEETING.

ROYAL INSTITUTION, 4th November, 1861.

The REV. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

Mr. THOMAS D. PHILIP, was elected a member.

The following gentlemen were balloted for, and duly elected
Corresponding Members, with their own consent :—

LOUIS AGASSIZ, Professor of Natural History in Harvard
University, Cambridge, Mass.

WILLIAM FAIRBAIRN, C.E., LL.D., F.R.S., President of the
British Association, Manchester.

Rev. THOMAS P. KIRKMAN, M.A., F.R.S., Croft Rectory,
Warrington.

It was announced that the Council recommended the name
of Captain James Anderson, Cunard service, for election as
the first Associate under the new Laws.

Mr. MOORE exhibited some fine specimens of fossil foot-
prints of birds from the Connecticut Valley, which were dug
out, and presented to the Museum by Captain James Anderson,
Cunard service.

Mr. Moore also exhibited a specimen of the animal of the
pearly nautilus (*Nautilus pompilius*) in spirits. This very
rare and remarkable specimen was obtained for the Museum
from Mr. Hugh Cuming, the well-known collector. The
President made some remarks upon the interest of the
specimen, and recounted the curious circumstances connected
with its discovery by Mr. Bennett, in the South Pacific ocean.
This specimen was brought to Professor Owen, who sent it to
Cuvier for inspection. Cuvier had already expressed his
belief that he should never live to see the animal, and the

event verified his prediction, for Professor Owen's specimen is said to have arrived at Paris the very day after Cuvier's death.

Dr. COLLINGWOOD exhibited specimens of a Fungus (*Coprinus conicus*), growing in Parliament-fields, and detailed the circumstances of the poisoning, a few weeks since, of some children who had incautiously plucked and eaten some. The symptoms were excessive dilatation of the pupil, coldness of surface of body, diminished frequency of pulse, and loss of speech. The countenance was smiling and pleasant; locomotion not much affected, but there were strange movements of the hands and arms. They soon recovered on the administration of an emetic.

The following paper was then read :—

ON THE STUDY OF THE CLASSICAL AND MODERN LANGUAGES.

BY WILLIAM IHNE, PH.D., *V.P.*

THE history of European civilisation sufficiently explains why the study of classical literature has so long held the principal place in every scheme of liberal education. Whatever of the learning of antiquity survived the overwhelming irruption of barbarism, was saved through the fostering care of the Christian church. The Catholic ritual kept a strong hold on the language of Rome, and the clergy found in the possession of that language a useful element of intellectual superiority over the rude warriors of mediæval Europe. The germs of a native national literature in the various countries of the West were thus either stifled altogether, or remained confined to the unlearned part of the population. Neither the Provençal troubadours, nor the minstrels of the north, nor the epic poets and minnesingers of Germany, ever succeeded in developing the beginnings of popular literature to works of poetic art,

calculated to lead to the production of national literatures equal to those of antiquity. When, in the fifteenth century, the mightier streams of Greek poetry, philosophy, and history, poured in on the West, and the mediæval Latin began to be purified by a more zealous study of classical latinity, there appeared to be no literature worthy of the attention of a liberal mind, save the great classic models. The Reformation, though appealing to the masses by means of the vernacular languages, and thus laying the firm foundation of truly national literatures, gave at first a still greater impulse to the study of the classical languages, without which a scientific theology was evidently impossible. The impulse then given is not yet arrested after the lapse of more than three centuries, although, in the mean time, the relative value and importance of classical and national thought have been entirely reversed.

When the Greek and Latin authors had once been firmly established in European schools as the models of taste, it was not easy to displace them by modern productions, or even to secure for the latter a toleration by the side of the former. The intrinsic excellence of the ancients, great as it is, at least so far as the Greeks are concerned, could not fail to be easily over-rated by their professional expounders. It requires the whole energy of the best years of a man's life to penetrate the spirit of antiquity, and to become familiar with the world of thought, feeling, knowledge, habit and expression of a bygone and altogether extinct generation. It is not to be expected that men, who have thus devoted the whole of their existence to a deep, all-absorbing study, should speak of it slightingly, or that they should easily admit rival claims. Their verdict has been accepted by the great number of the half-learned, and by the still greater mass of totally unlearned men, with whom not to know is to admire, and with whom familiarity breeds contempt. If to this is added the great support derived from the legal possession of old endowments,

the natural spirit of conservatism that pervades mankind, and the veneration of all that is old, we have no difficulty in explaining the exclusive hold which the languages of antiquity have, not only on our higher seats of learning, but even on those elementary schools which have for their object to give a general education, and to prepare boys for the practical duties of life.

In the remarks I am about to make, I shall confine myself to the latter class of schools. I am fully convinced of the value and necessity of classical studies for professional scholars; but reflection and experience have led me to the conviction that it is high time to modify the curriculum for our non-professional youth, to adapt the study of languages to their peculiar requirements, to save them useless labour, and to give them what will not only educate the mind, but prove also a valuable acquisition for after-life.

The wonderful development of modern national literature has been too great to be entirely ignored. Even the greatest admirers of the ancient writers would not venture to assert that there is nothing in Italian, Spanish, French, German, and English literature deserving of earnest study. The advocates of classicism have, therefore, shifted the grounds of their argument, and instead of relying only on the alleged superiority of the works of antiquity, they maintain that the languages of the Greeks and Romans are unrivalled as a material for mental training. To this argument they are driven the more forcibly, as they must admit that only a very small fraction of the learners ever succeed in pushing their studies so far as to be able to appreciate the transcendent beauty of the classical writers. With the exception of a few men in Europe, who might be numbered on our fingers, nobody reaches that familiarity with the inmost life of antiquity which distinguished the great philologists of the past; men such as Scaliger, Salmasius, Ruhnken, Bentley, and Porson. A certain pro-

portion of those who make the study of classical antiquity the exclusive business of their lives, read Sophocles with the emotion, and Aristophanes with the shaking laughter which would come over them when reading Shakspeare or Molière. But the vast majority, even of the teachers of the classics, raise themselves only by a special effort into that region of intelligent sympathy which should be spontaneous and natural, if they would hold converse with an author, mind to mind. If this is the case with the professional student, what shall we say of the amateurs? Is it not a matter of notoriety, that among our divines, our legal and medical practitioners, among our college-educated gentry and legislators, there is hardly one in a thousand who is sufficiently familiar with the great writers of Greece and Rome, to relish a dialogue of Plato, or a comedy of Plautus? Can it be said of the best poets and historians of the present day, that they have been inspired and guided by the ancient models—nay, that they have been even remotely influenced by them in their style or their conceptions? It is not too much to say, that in proportion as our writers have been independent of the influence of antiquity, in so far have they reached excellence. Has Lord Macaulay the least smack of Thucydides or Tacitus? Can the influence of Cicero be traced in Gladstone? What is there classical in Göthe, except the professed imitations, or in Shakspeare, except the mere fable for a few of his plays? And is not the genius of Milton kept in bondage by his classic lore, and by the learned apparatus of classic allusions and imagery with which his works are overloaded?

If such is the practical result of the classical studies on the learned and educating classes of modern society, what can be said of it with regard to that vast majority who leave school at sixteen to enter the counting house, the workshop, or the store? Are they likely to carry with them a breath from the groves of Academus, or a thrill from the Roman forum? They

have spent dreary hours and precious years in painfully acquiring a smattering of elementary grammatical forms, a wrong impression of what ancient literature really was, and a hearty disgust for the whole scheme of education, and they generally succeed in speedily forgetting down to the very letters, all that they have had drummed into them. Now, of this class of students is made up the great mass of those for whose especial benefit the classical languages were introduced to reign supreme in modern schools.

To justify this course of study, the argument, as I said, is shifted, and it is gravely maintained, that to bring out a boy's mental powers, to make him an intelligent man of business, an engineer, a soldier, or an artist, you must teach him Latin and Greek, not that he may afterwards have a knowledge of Latin and Greek, or turn such knowledge to any practical purpose, but because, unless you teach him this, his mind will remain weak, its strength and capacity undeveloped ; there will be no chance of bringing out his power of judgment, his memory, his application to hard work ; in short, the two classical languages, if they did not exist, would have to be invented merely for the purpose of making boys perform that process of thinking, which, it would appear, can be evoked in no other manner.

Now, on the very threshold of this argument we meet with the gratuitous assumption that Latin and Greek must necessarily go together. They are like the Siamese twins, inseparable in their corporeal existence. If the Greek language, one would fancy, is so admirably adapted for educating the mind, why should it require the auxiliary screw of Latin ? or *vice versa*, if Latin will do the work, why tack Greek to it ? Is it merely adding a trifle ? Is it killing two birds with one stone ? Does one language draw the other after, as a natural consequence ? Why, if Latin is hard, Greek is harder, and the study of the one does not facilitate the study of the other

at all, except in so far as any one foreign language, once thoroughly acquired, gives a certain grammatical and linguistic knowledge which will be useful for further study.

I therefore maintain that, if the classical languages are taught not for their own sake, and for the sake of their respective literatures, but for educational purposes only, one of them will answer the purpose, and it is unwise to overtax the energies of youth by gratuitously burthening the mind with double the weight that is absolutely necessary.

But let us now examine that famous theory which, by dint of frequent repetition, has almost acquired the character of an axiom, viz., that Greek and Latin surpass modern languages in educational power.

As language is the embodiment of thought in sound, the study of language, if not directed to a merely practical purpose, is the study of thought, and as such a logical exercise. Its object must be to compare the linguistic *form* of thought with its ideal *conception*, and to ascertain the degree of accuracy with which the audible or visible forms of a language express the pre-existing thought. If a language is so cultivated, that it has accurate and precise expressions for every form of thought, its study will have a reaction upon thought itself, for it will supply the student with the result of the mental labours of others, and give direction, consistency, and system to his own. A language, poor in words, loose and vague in their application, rude in their combination, will not enlarge the intellectual range of the student, nor strengthen his power of discrimination, taste, and judgment. A language so uncultivated must necessarily be the language of an uncultivated people; intellectual culture is incompatible with a barbarous idiom. It follows, therefore, that the languages of civilised nations, such as those of Germany, France, and England, must contain the spirit of their mental culture, and that the study of these languages must tend to impart with

every word that we learn a part of that spirit. Unless it is shown that the intellectual culture of the ancients was superior to that of modern nations, it cannot be maintained that the study of their languages is more profitable for developing thought. Now, the culture of the Romans was not great; they are far surpassed by us in every thing save systematising law, and consequently, their language is inferior to ours in precision, fulness, clearness, and pathos. The want of the article alone is a great defect; another is, the frequent vagueness of meaning in a very considerable portion of the vocabulary. Let any one read the description of a mechanical contrivance such as that of the Siege of Massilia, in Cæsar's *Bellum Civile*, or of the Gallic walls, or of the bridge over the Rhine, and he will at once confess that no modern writer, aspiring to classical rank, could leave such an unsatisfactory impression on the mind of his readers. The same vagueness, though more pardonable in poetry, is constantly found in Virgil. I speak not now of turgidity of style, such as that of Cicero, nor of the empty grandiloquence and bombast of Sallust, nor of the studied compression of diction peculiar to Tacitus, but of that vagueness of expression from which even Livy, the greatest master of Latin prose, is not entirely free, and which is inherent in the language itself. The primary object of education, through the study of language, is to attain a full, transparent, accurate expression of thought, and in this no Latin writer can excel the best classics of modern times.

The Greek language, it is true, far surpasses the Latin in perspicuity and precision. It is, therefore, well adapted for the purposes for which its study is retained; but whether it is much superior to modern languages, may be doubted, and certainly its superiority is not such as to compensate the general student for the great effort necessary to master it.

But if the educational value of the modern languages is to be realised, it is necessary that they be studied in a rational

way ; not, as is too often the case, by rote, or by what is stupidly called the natural system, *i.e.*, the system of the nursery, which is no system at all. How far we are yet from accomplishing this, even in the better schools, and for what reasons, I shall point out below.*

I have alluded to the great difficulty of Greek. Now, this difficulty, so far from being considered an objection, is looked upon as a merit, and as a recommendation.

The pupil, it is alleged, is called upon to make an effort—to work hard ; his intellectual strength is brought into play and developed by these mental gymnastics. Allowing all due force to this argument, I would only ask—Are modern languages so very easy ? Do they require no effort, no application, no memory, no thought, or judgment ? Why, one would fancy that those who use this argument are generally so woefully ignorant of modern languages, only because they are afraid of weakening their intellect by learning them. Perhaps they consider them only as light accomplishments, suitable for young ladies, but far beneath the notice of scholars. But, to speak seriously, of this I am sure, that no one will ever refer to the “too great facility” of modern languages, as an argument for not learning them, who has ever made the serious attempt to master only *one* of them.

Of course, I do not mean to deny that modern languages are easier ; what I say is, that they are sufficiently difficult—that the classical languages are too difficult—for the purposes of elementary and general education ; and that the latter ought, therefore, as a rule, to be reserved for the professional student.

Perhaps no special arguments or facts are required to prove the difficulty of Latin or of Greek. There are very few,

* Much light is thrown on this subject in an admirable paper, by Dr. James Clyde—*Principles of Method in the Teaching of Languages*—in the second number of the *MUSEUM*. 1861.

indeed, even among the moderately educated among us, who have not had enough proof of that, and more than they desired, in their school days. But the difficulty of which I speak, and which makes the dead languages less fitted for educational purposes than the living, is not that which lies on the surface, and which meets the student in the earlier part of his career. It is not the difficulty of mastering the multitudinous inflections, or the syntactical peculiarities, or even the vocabulary, in its common acceptation. All this may be acquired in a few years by even moderately able boys. I speak of a difficulty much greater than that—a difficulty which lies so deep that it is not even perceived and recognized, much less mastered, by the majority of so-called classical scholars themselves. It is a difficulty suggested by that most appropriate term “*dead*,” by which we designate the idioms of Greece and Rome. It is the difficulty of giving life to a corpse ; of breathing a soul into every word that comes to us not from the heart and from the lip of men living around us, thinking and feeling on the whole like ourselves, but that we dig up from the grave of books,—words which in numberless instances have no correlatives in our own language, which speak of facts and institutions which neither our learning nor our imagination can conjure up into a reality of conception ; it is the difficulty of living back into the thoughts, feelings, the religion, the common notions of morality, of honour, virtue, and vice—into the social and political institutions of a bygone age. This is a difficulty worthy the life-long study of a great mind. It is a difficulty never entirely, but sometimes creditably, overcome by our great classical scholars ; but it is a difficulty which, unless overcome, makes the study of Latin and Greek a profitless acquisition of empty words and false notions.

If we turn to modern languages, we shall find a great difference. Whatever national diversities exist among the

various peoples of Europe, still we are, after all, only branches of the same great European family ; and we are intellectually, morally, socially, in politics and in religion, not separated from one another by any impassable gulf.

There is not much in the writings of any recent foreign author that requires special explanation or learned commentary, and there is nothing that could not be easily explained, as we have living analogies in our own country for all that foreigners may allude to. Our churches, our palaces, and our humble dwellings, are similar all over Christian Europe ; the streets of our towns, the furniture in our houses, the dresses, the tools,—all that fills up our daily life, presents only such variety as can make the study of these things interesting and attractive by comparison. A Shaksperian drama can be acted in Germany with as much success as in England, whereas the late revival of *Antigone* was a dead failure. In short, European nations understand each other, whilst antiquity is, to all but the deeply learned, a sealed book.

The defenders of the classical studies, though generally pretending to despise such low considerations as that of mere usefulness, and though inclined to sneer at the utilitarian *cui bono* question, nevertheless, claim for the study of Latin a special and very important practical utility, which, they assert, goes far to recommend it. It is affirmed, that as a great portion of the English vocabulary is derived directly or indirectly from Latin, a knowledge of that language is absolutely indispensable for those who desire to have a complete command over English. I am not aware that a knowledge of Greek is also demanded for the illustration and thorough comprehension of those barbarous abominations with which our scientific men have stocked their technical language, and which some of our enterprising tradesmen have stuck over their shop doors. I think it not likely that any man in his senses would deem such labour justifiable by such results.

Granted, therefore, that in the case of Latin the argument were tenable, it would not apply to the Greek language, unless, as hinted above, the two languages are absolutely inseparable.

But is the argument valid? Is no man competent to speak and write pure, idiomatic, forcible, and correct English unless he is conversant with Latin? If it were so, it were a serious matter. But is it not an insult to the English nation—an insult not less offensive because utterly unfounded—to say, that their language has not within itself the standard for determining the meaning of the words which it employs? English is a *living* language—it is sovereign in its own domain—it puts its own stamp on, and fixes the value of, its current coin—it fuses and recasts the foreign metal to suit its own convenience. There are English classics to decide what should be the meaning of English words, and in England, no less than in Rome, *usus jus et norma loquendi*. The argument would have more force if it were applied to recommend the study of Anglo-Saxon, for that is, after all, the groundwork of modern English. The tenderest fibres and the deepest roots of the tree strike into that soil, and yet how neglected is its exploration? Which English writer ever thought that his command of his mother tongue was superficial on account of his ignorance of the language spoken by Caedmon and Alfred? Why, no one would think it necessary to go to a dead language to find the meaning of living words. Many writers in this country whose style has the true English ring, knew their mother tongue alone. Bunyan's English is, perhaps, as good as Dr. Johnson's, and few will find fault with Cobbet; Mr. J. Bright speaks tolerable English, although, perhaps, he does not pretend to great familiarity with Latin. What shall we say of English ladies? Very few of them dive deep into classic lore, and yet how many are distinguished by the elegance and force with which they can use their pen and their tongue. It was said of the

noble Roman matrons that they spoke Latin with peculiar elegance and purity; the influence of Cornelia was traced in the eloquence of the Gracchi. The same may be said of English ladies in good society. It is their teaching which, in early youth, lays the foundation for a correct, genuine, natural style, which, if afterwards cultivated by the serious study of the best English classics, by intercourse with men of refined taste, sound judgment, and good breeding, can be developed into model English without the assistance of any foreign language whatever.

It has been the custom, for many years past, to exclaim against the continual introduction of new French and Latin words into the English language. More than that, it has been found that the Saxon element in the language has been unduly depressed by many writers of the Johnson school. Good old forcible words have been set aside for pompous polysyllables, as it would seem, merely for the purpose of puzzling plain Englishmen, and of proclaiming the high attainments of those who use the foreign jargon. This process of Frenchifying and Latinising the English tongue has been growing since the times of Chaucer, since the translation of the English bible, since Shakspeare, Milton, and Johnson. Where it will end, nobody can tell. But if English is to remain a pure national language, it behoves us to stop up that source from which the French and Latin pour their streams into the clear waters of the native language. Instead of demanding a knowledge of Latin that we may understand Latinised and Gallicised English, we should banish all those unnecessary importations which make Englishmen strangers in their own land.*

* As an instance of the misapplication of words, caused by the ignorance of their Latin roots, the following has been quoted—"The fundamental features hinge upon," &c. But mistakes of this sort argue thoughtlessness and general want of cultivation and study, not ignorance of Latin. Thus, the liner who speaks of the information he has "gleaned" from several "sources," might know the proper meaning of "sources" and of "gleaning," without studying Latin.

A second utilitarian argument in favor of Latin (again not of Greek also) is, that it facilitates the study of French, Italian, Spanish, Portuguese, and Wallachian. This fact cannot be denied. Latin once acquired is a ready key to all the Romance dialects. But our boys who are to learn French do not know Latin—they have to learn it first; and the question therefore is—Does it take more time and trouble to learn French alone and directly, than it takes to learn Latin *first* and French afterwards? Is the previous study of Latin really such a “short cut” to French? Are two sides of a triangle really shorter than the third? and is the more difficult study the proper introduction to the easier? If so, then by all means let us recommend our students to master Gothic and the Norse before they begin German or Danish, and let the continental student of English acquire a thorough knowledge of Anglo-Saxon before he attempts the language of Shakspeare. The notion is so preposterous that it can only call forth a smile; and I should not have thought it necessary to allude to it had it not been advocated by no less an authority than Max Müller (*Museum*, III. p. 132). It is one of the ever-repeated, ever-refuted, and still reiterated platitudes which must supply the place of arguments in a desperate case.

In all that we do, it is desirable to finish the task we undertake. It is a detrimental habit, and a profitless toil, to begin a variety of things and leave off in the middle. Besides unfitting us for really useful labour, it engenders a feeling of dissatisfaction, and a sour spirit of disgust. In better conditioned minds it causes bitter regret for misspent time and energies. These are too often the results of the hopeless task set before our youth. Now, this is not the case in the study of modern languages. If it is properly conducted the object can be accomplished; a familiarity can be obtained with French, or German, or Italian, sufficient for a well-defined practical purpose. Not only are the vast treasures of

French and German literature opened, but even the final object of every language, which is, to serve as a medium for communication of thought, can be attained. A boy can leave school at seventeen, able to carry on a conversation in one or two modern languages, to write a decent letter, and to read any book with great facility.

Now this is an achievement not to be despised or disparaged, as it often is, by the advocates of a more pretentious, but less useful, education. For, after all, education must aim at what is practical and useful. Good penmanship does not cultivate the mind, but still good penmanship is one of the primary requirements of school instruction, because of its usefulness. The modern languages do cultivate the mind, and they are also eminently useful; therefore, they are preferable to those languages which have only the one recommendation and lack the other.

Nor is it only the advantage of acquiring the practical use of a foreign idiom which entitles the study of modern languages to a place in our schools. It is not less the fact, that whilst studying them, the pupil can acquire, through them, a variety of useful knowledge. The classical writers do not contain, incidentally, much information, useful in itself, except such as is historical. Modern literature, besides supplying this, can be made to convey most useful lessons in physical science, in natural history, geography, and in social science; it can be made one of the numerous channels through which a knowledge of the surrounding world is poured into the mind.

In speaking of this subject, I am naturally led to compare the available school literature of antiquity and modern times. It is a deeply felt, but rarely confessed drawback of classical literature that it contains so little specially suited for the cultivation of the youthful mind. The consequence is, that a very small number of books, and even those often objectionable, form the ever-recurring curriculum of our schools.

It is impossible for a superior teacher not to become tired of the everlasting repetition of the same subjects, and for a routine teacher not to work in the end mechanically. Modern literature, on the other hand, is an inexhaustible mine. It offers the greatest variety of reading. It contains enough that is morally pure, chaste, and elevated. Even that which is not written purposely for youth is more within the grasp of the youthful intellect. It refers to things, persons, institutions, and facts, of which children have a living experience; it, therefore, excites curiosity, sympathy, interest, sometimes even criticism, instead of that torpid indifference with which most denizens of grammar schools wade through the commentaries of Julius Cæsar. Compare the effect on a boy, of the latter book and of Napier's Peninsular War. Will he be stirred and flushed by the skirmishes of the Romans with the Lexovii, the Carnutes, the Curiosolites, as he most certainly will by the storming of Badajoz and the battle of Talavera? Will a speech of Cicero affect him like one of Burke or Pitt? I am well aware that some educators object to this lively interest taken by the pupils in the matter they read about; but I cannot find words strong enough to express my contempt for such views.* Children are only men in a less developed state. Every system of education which expects from children more self-denial, more self-control, than can fairly be expected from adults, is absurd. No man who has the privilege to choose between a dull and a lively book, would choose the former; and why should we condemn children to dulness, to which they are opposed even more than men? Why, it is one of the principal, one of the noblest duties of the educator to evoke and direct the sympathies of youth for what is great and good,

* "It is beginning to be suspected that the repulsiveness of studies is far from being an essential element in their educational value. It is well known, for instance, that no instrument but the birch rod can drive into a boy's head the old Latin grammar, with its rules couched in crabbed sentences of that very language which it was designed to teach. This quality, necessitating the use of severe discipline, was, of course, exactly what recommended the Latin grammar to our grandfathers as an universal primer."—*Times*, 20th Jan., 1862; page 8, col. 5.

to cultivate the taste, to encourage the nascent powers of reason, and thus to form men who can think for themselves.

And here I touch upon a subject, never, as far as I am aware, adverted to in this present controversy. I said it is desirable to cultivate in youth the power of criticism. Now, with regard to the classical languages, we are hardly in a position to exercise this power. We are as aliens in a foreign land, not entitled to the full franchise, which gives the right to approve or condemn. Hence arises, to a great extent, that indiscriminate laudation, lavished on almost every production of classical literature. We humbly kneel at the altar and worship. We never venture to raise our eyes in order to scrutinise the features and proportions of the idol. We do not presume to have an opinion on what is proper in expression, in style, in arrangement, or in general composition. This is a slavish feeling which must stunt our judgment and warp our taste. It arises from that great difficulty of the *dead* languages to which I have referred. In modern literature we are competent not only to approve, but also to blame ; we are able to discriminate ; we apprehend the possibility of higher excellence than that which we see attained ; and thus, whilst we really cultivate our judgment, which is necessary for the purpose of education, we open up to our literature itself the road to greater perfection. Of this I am certain, that the incubus of classical literature has long depressed the efforts of our own writers, and is doing so at the present time, and nothing will be more calculated to the advancement of literature than if we direct the studies of youth to it as a subject worthy of serious attention, deserving of admiration, and susceptible of further improvement.

Our greater command over modern languages enables us in another direction to make their study more profitable than that of Latin and Greek. We are able, or ought to be able, to procure more competent teachers for these modern studies. At present all the resources of our great educational establish-

ments ignore, or all but ignore, living languages. The students of Latin and Greek have it all to themselves. Yet, in spite of this, it is a very rare thing to find competent teachers in the numerous grammar schools all over the country. The merest superficial acquaintance with elementary grammar, the routine reading of a few books of a few authors suffices to establish a man as a "classical scholar," and as a teacher of the classical languages. Parsing and construing is all they attempt. They deal with words. Even if they were disposed to penetrate into the spirit of the writers whom they "do" into English, they would find it beyond their power, on account of the great difficulty of the task. Hence the low level of classical teaching throughout Europe. This is a state of things which would not, and could not take place, if half the attention were given to modern languages which is now lavished on Latin and Greek in our schools and universities. At present, the teaching of French and German is mostly in the hands of foreign adventurers, political refugees—real or pretended—of men who have been driven by adverse circumstances to seek a livelihood as teachers. This circumstance alone is a disgrace, not to professional educators only, but to the society which tolerates it. If these matters were managed with the judgment of a wise legislature and government, we could be supplied with a staff of modern teachers equal to their task; men, whether natives or foreigners, thoroughly masters of the subjects they profess to teach, and able to teach them in an intelligent, attractive, mind-cultivating, profitable method.

The conclusion to which we come is, that modern languages are not less suitable for the education of the mind than those of antiquity, that their acquisition is more easy, the study of them more satisfactory, and the results more useful; that they can be more thoroughly taught in the usual school curriculum, and that, for those boys who are not intended for a profession, they may safely and profitably be substituted for Latin and Greek.

At the conclusion of this paper a warm discussion ensued, in which several gentlemen took part.

The Rev. J. ROBBERDS commenced by taking exception to the too great depreciation of the classics which he thought Dr. Ihne inculcated. There were many pictorial representations, or word paintings, in classic writers, which were very generally appreciated even by schoolboys; and he referred to the exclamations of Xenophon's army when they came in sight of the sea, "Thalassa! Thalassa!" as one which had always stirred his spirit. He considered that a knowledge of Latin was almost essential to a full comprehension of our own language. The same with French, the puzzling genders of which tongue were much simplified by remembering the declension of the word in Latin.

Dr. COLLINGWOOD said that he was unprepared to hear Dr. Ihne speak in any way slightingly of the classics. For his own part, he fully agreed with Mr. Robberds in the value of their bearing upon modern languages, and particularly upon our own. Then, for the scientific man, (who was not necessarily a *professional* man) so many vocabularies of terms were derived from Latin and Greek, that he defied any one to remember or understand them who did not know something of those languages; and persons who were ignorant of the classics fell into a slovenly and uneducated manner of pronouncing such terms. He would admit that the classics were too often taught without that appreciation of their genius and meaning which was necessary to render them valuable as mental food. It was generally objected to them that they had a demoralizing tendency; but that objection arose from the fact that their true bearing was not generally understood; and the beautiful physical truths, concealed under the apparently barbarous fables, were lost for want of the effort to remove the dross with which they are often covered.

Mr. CLARK maintained that the greatest models of human genius were to be found in the classic writers, and recommended the study of them as ennobling to the mind. Further, the fact of the New Testament being in Greek should be sufficient to stamp that language as essential as a branch of a liberal education.

Dr. NEVINS bore testimony to the influence of classical studies upon the characters and attainments of boys in other branches of scholastic information, such as he had been in the habit of teaching.

After some further remarks from the Rev. A. STEINTHAL, Mr. UNWIN, and the PRESIDENT,

Dr. IHNE replied to the whole, remarking, that he had anticipated the objections made by the several speakers, and had hoped to have disposed of them. Perhaps he had not expressed himself with sufficient clearness. He wished particularly to remove the impression apparently made on some speakers, that he had condemned the study of classics *in toto*. He admitted their importance for professional men, and all his remarks had reference only to youths not destined for a learned profession.

THIRD ORDINARY MEETING.

ROYAL INSTITUTION, November 18th, 1861.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

The following gentlemen were balloted for, and duly elected members:—Mr. C. WYE WILLIAMS, A.I.C.E., and Rev. J. NUGENT.

Several donations of books were laid upon the table, and thanks voted to the donors.

Mr. FABERT exhibited the log of the Oldenburg barque *Australia*, Captain WILHELM GUTKASE, from Liverpool to Sourabaya and Samarang. This log was beautifully and carefully executed by the captain, and exhibited the latitude and longitude for every noon, and the barometric and thermometric readings for three fixed periods daily, namely, four, a.m., noon, and eight p.m. These were arranged in a diagrammatic form, so that the variations could be appreciated at a glance. The captain, who was present, obtained great praise from the Society, as well as from some gentlemen particularly connected with nautical instruction.

Mr. MOORE exhibited a large specimen of the rare cuttlefish, *Rossia macrosoma*, which had been taken in the Dee, by Mr. Alfred Walker, of Chester. It is but quite recently that this cephalopod has been known as an inhabitant of our rivers.

The PRESIDENT exhibited some specimens of a curious Oceanic Mollusc, *Litiopa bombyx*, and gave some account of its remarkable habits. These specimens had been taken upon the gulf-weed of the Atlantic, by Capt. Mortimer, of the American ship *Florida*, now in this port.

A paper was then read—

ON THE OPPORTUNITIES OF
ADVANCING SCIENCE ENJOYED BY THE
MERCANTILE MARINE.*

BY CUTHBERT COLLINGWOOD, M.B., F.L.S., &c.

At a late meeting of the British Association, the importance of the vast trade of Liverpool, in its bearing upon the arts and sciences, was recognized by the appointment of a committee to draw up statistics of the vegetable, animal, and mineral products brought annually by the immense mercantile marine of that great port. The productions of nature, collected from every part of the world, as *profitable cargo*, for the purpose of being used in the arts and manufactures, were the subject of that report; and, indeed, to no one spot in the civilized world are brought such a vast variety of substances—raw material and worked fabrics—as to Liverpool. The mercantile marine of the port of Liverpool, engaged in foreign and colonial trade—amounting to 4,500 sail, measuring $2\frac{1}{2}$ millions of tons, and employing many thousands of men—exhibits an amount of enterprise, such as, probably, no other age, and no other place, has ever before shewn. The whole globe is scoured by these men and ships in search of whatever may conduce to civilization, and to the wealth of the country which is the centre of this vast and important combination.

* This paper was originally read before Section D of the British Association, at Manchester, 1861, but is nowhere else printed. Copies, in the present form, have been largely circulated amongst those interested in shipping.

The following table shews the number of ships making Liverpool from foreign ports in a given year:—

OFFICIAL RETURN OF FOREIGN AND COLONIAL
TRADE FOR 1857.*

| | Vessels. | | Vessels. |
|--|----------|----------------------------|--------------|
| From the United States | 934 | From West Coast of Africa— | |
| (Averaging more than 1,000 tons each.) | | Foreign ports | 74 |
| From British America | 493 | „ Do. British possessions | 37 |
| „ Central and S. America | 505 | „ North Ports of Russia. | 71 |
| „ East Indies, Hong Kong, | | „ South Ports of Russia... | 31 |
| and Australia | 331 | „ Channel Islands | 36 |
| „ China (exclusive of | | „ Norway..... | 13 |
| Hong Kong)..... | 17 | „ Wallachia and Moldavia | 13 |
| „ France | 317 | „ Syria..... | 13 |
| „ Spain | 295 | „ Fernando Po | 3 |
| „ Portugal | 169 | „ Ionian Islands | 11 |
| „ Italian States | 174 | „ Gibraltar and Malta ... | 10 |
| „ Belgium | 123 | „ Philippine Islands | 11 |
| „ Holland | 116 | „ Morocco | 10 |
| „ Germany | 101 | „ Sweden | 7 |
| „ Turkey | 101 | „ Java | 2 |
| „ Egypt | 98 | „ Greece | 7 |
| „ Cuba, and foreign West | | „ Tunis | 1 |
| Indies | 96 | „ Burman Empire | 1 |
| „ Prussia | 75 | | |
| „ Denmark | 74 | Total... | <u>4,528</u> |

The above, it must be borne in mind, represents only the ships *arriving at* a single port in a given year, and the numbers are annually increasing.

Nor is the port of Liverpool, although the largest, representing one-third of the commerce of England, the only one to which similar remarks are applicable; and it therefore becomes a question worthy of consideration—How is it that such a vast staff of enterprising men, constantly sailing to all parts of the globe, do so little to add to our knowledge of the

* Baines' "Liverpool," 1860.

natural productions, which they, of all men, are in the very best position to explore, and best able to provide for the investigations of scientific naturalists at home? Why do these men, confining their attention to the immediately useful results of the trade in which they are engaged, altogether pass by natural objects, the collection and contemplation of which could not fail to be a source of interest; and which, to men with a moderate degree of education, would, it might be imagined, afford the stimulus of a rational pride?

One thing is certain, viz., that no accessions of importance are derived to our museums and collections from the labours of sea-faring men. A piece of coral, a parrot, a shell or two, or something which has received attention from its oddity, is occasionally brought by the sailor from the rich and interesting regions which he has visited; but, as a general rule, anything of value or importance is not even to be looked for. No system of any kind marks the seaman's gatherings, and when they have been distributed among his friends and patrons in England, the contents are generally regarded as lumber; and after remaining for a time where they were first placed, they are laid aside or thrown away to make room for something more useful. It is this utter want of system—this absence of rudimentary information, which renders the ordinary collections of seamen so entirely valueless.

There are, however, a few, a *very* few, honourable exceptions, in men whose intelligence leads them to see the value of the opportunities they enjoy, and to make use of them, as far as in them lies, for the improvement and advancement of knowledge. The interest of the objects brought home by them can only be appreciated by those who are so fortunate as to have them brought under their immediate attention; and is a strong stimulus to the natural desire for further and more abundant accessions. The willingness of these gentlemen to render their assistance in any direction in which their scientific

friends ashore point out that they can be useful, only serves to place in the strongest possible light the immense value which would accrue to science were a *large body* of such men, instead of only one or two, constantly employing themselves in a similar manner. We cannot expect all captains of vessels, or indeed perhaps any, to use in this direction the intelligence of a Darwin or a Huxley ; but it is not, perhaps, too much to look for, that they should exercise a moderate degree of interest in the acquisition of rudimentary information, and a certain amount of capacity in the selection and collection of the multifarious objects which daily come under their notice.

The difficulties which are uniformly brought forward against the idea of seamen turning their attention to natural history, are chiefly on the score of want of time to attend to anything except their own immediate business. But those who are best competent to judge, give a different account. They tell us, indeed, that the seaman, during his passage through subordinate grades, has his hands full, and his attention entirely occupied by his ship-duties ; but when he is entrusted with a command, the case is different. He is no longer a servant on board his vessel, but a master—his life of active employment is changed for one of *comparative* idleness ; and it is well if the time thus left on his hands is not put to an evil use. Sailors have not the advantages which the mechanic enjoys upon shore ; none of the ordinary rational modes of spending his hours of leisure are open to him ; he is dependent upon himself for amusement, and this is more particularly the case with the captain. How often, unfortunately, do we hear of captains of merchant vessels being charged with intemperance, cruelty, and the long train of evils resulting from an unoccupied mind, and the absence of sufficient employment for the mental and bodily energies. The ship is not *always* in a gale—she does not *always* require the close supervision which is doubtless often necessary. There are numerous

seasons of repose, and ample time which might be employed in the pursuit of those rational amusements or studies which would yield a vast benefit to science. This is an important point, and one on which I should speak with diffidence, were I not assured by men of the most practical knowledge, and in command of the most important vessels, that there are abundant opportunities for such investigations ; whereas, the time which might be so employed is too often consumed, for want of such resources, in idleness at sea, and intoxication ashore.

Again, a captain naturally feels that should he devote attention to natural history, he might lay himself open to the charge of neglecting his ship's duties. His owner might, possibly, be narrow-minded enough to condemn him for allowing anything to occupy his mind beyond the routine of ship-work ; or he might even be short-sighted enough to imagine that a man with an object in his moments of leisure is less fitted to occupy a position of trust than a mere machine, who has no idea beyond the mechanical duties of his profession. And not without reason is this fear—a fear which I know weighs considerably with conscientious captains, who would, if they received the sanction of their owners, do great service to science, without abating one jot of their vigilance in their primary duties.

The main point, then, to be considered is, how ship-owners generally can be induced to sanction in their captains the cultivation of those tastes which they often possess, and which cannot but have a beneficial influence upon their character ; and to encourage the improvement of those opportunities which they so abundantly enjoy. This is the great desideratum—and until this is done no great good can be effected. The merchant captain of intelligence must know that his attention to natural history, or any other branch of science, not immediately connected with his ship's duties, is not only *not* looked upon with suspicion by his owner, but is *encouraged*

by him. He must feel that his master regards his scientific studies and attainments, not as unfitting him for command and full confidence in the management of the important interests entrusted to him, but as absolutely rendering him *more* trustworthy, on the principle enunciated by a well-known member of the mercantile marine service, that "*a man with a hobby is always safer, both at sea and on shore, than a thoroughly idle man.*"

My object, therefore, in bringing this subject before this section of the British Association, was to endeavour to point out where the difficulty lies, in order that *that* point being clearly understood, that influential and important body might by some means be brought to act in conjunction with ship-owners, and others connected with shipping, of which interest Liverpool and Manchester constitute the active centre. And I urged that the matter should not end with the reading of this brief paper, but that a committee should be formed under the auspices of the Association, which might confer with some body of ship-owners as to the best means of carrying out this most important object, and of opening up this wide and fertile field of scientific research.

I need scarcely dwell upon the manifold advantages, which would necessarily accrue were this scheme elaborated and brought with care and judgment into a working condition. Many will at once occur to every thinking mind, and others will unfold themselves in the process of time. Museums, such as those of Liverpool and Manchester, should not lack specimens in any department, with such a staff of industrious and intelligent collectors constantly bringing home contributions.

But by no means the least important result would be the elevation of the mercantile marine service, as a body, and their emancipation from the evils too often looked upon as inseparable from their habits of life, by giving them a rational

object on which they may expend their energies, when not called upon by pressing duties on board ship. Having few of the resources which those possess whose life is passed on shore, and herding together, as they do for months at a time, with scarce any of the amenities of life, it cannot be otherwise than that their minds should degenerate to a dull blank, or even to a worse condition; and it too often happens that in this respect the captain is in no degree superior to his crew.

Variety of occupation is no less necessary to the sailor than to other men, and any attempt to debar him from so essential an element in a well-regulated mind cannot fail to be productive of evil. Regarded, therefore, from a philanthropic point of view, it is a subject worth inquiring into, whether, or not, some scheme may be rendered feasible, by means of which this opprobrium may be removed. No ship-owner will deny that such an amelioration of the seaman's character would be ultimately followed by advantage to his own personal interest but that advantage is not to be reaped suddenly. Let us hope that it is not too distant in its prospect to offer the inducement to take some trouble for its accomplishment.

The direction which I have here supposed the ship-captain's energies to take, is however by no means the only one which may be followed with usefulness and advantage. I have made it prominent, because I believe it would be, in a vast number of instances, adopted with most useful results. But men's tastes, doubtless, differ considerably, and the study of Natural History would not commend itself to all. Various subjects of study might be followed out as advantageously as the one I have enlarged upon as a text, and the sciences of physical geography, of geology—the investigation of meteorological phenomena, of currents, tides, winds—the study of hydrography, of ethnology, &c., would all receive important accessions from the intelligence which a higher standard of education would develope among our merchant marine. These

subjects, however, should all be considered by the committee I have proposed, and a scheme for instruction *on board ship* elaborated with care, which, in the next generation, would yield ample fruit.

Some *stimulus*, however, would undoubtedly be needed to carry on this work ; and the nature of the rewards which should be offered to induce the co-operation of merchant officers should occupy our careful attention and consideration. Among the commanders of the mercantile marine there are many intelligent men who would gladly embrace the opportunity, if it were afforded them, of distinguishing themselves in the walks of science, and of raising themselves above the level to which they are at present doomed. Whether this stimulus, then, should be of the nature of honorary certificates—pecuniary or honorary rewards—association with scientific bodies already in existence—or of any other kind, would be an important matter for after consideration. Enough, however, has been said to bring the matter fairly before the public, and in their hands I now leave it, hoping it may not be permitted to fall to the ground. I trusted also that it would be taken up by the influential members of the British Association, connected either with science or with commerce, my own humble co-operation being always at their service ; and in this I was not disappointed.

This paper would be very incomplete without some notice of the important steps which have been taken since it was read to the British Association, on the 7th September 1861. On that occasion, considerable discussion was elicited, in which the President of the Section (Prof. Babington, M.A., F.R.S.), Dr. Lankester, F.R.S., Professor Williamson, F.R.S., Mr. John Lubbock, F.R.S., Mr. J.A. Turner, M.P., Rev. H. H. Higgins, M.A., Mr. R. Patterson, F.R.S., and others, took part ; all agreeing in their estimate of the importance of the

subject, and the great and beneficial results likely to accrue from a well-elaborated plan of operation. Subsequently, in the committee-room, the subject was again brought forward by Dr. Lankester, and a committee was appointed to report upon the best mode of carrying out the scheme, of which the writer was requested to take the direction. This committee consists of the following gentlemen:—

Dr. COLLINGWOOD, M.A., F.L.S., Liverpool.

R. PATTERSON, F.R.S., Belfast.

JOHN LUBBOCK, F.R.S., F.L.S., London.

JAS. ASPINALL TURNER, M.P., Manchester.

P. P. CARPENTER, Ph.D., Warrington.

Rev. H. H. HIGGINS, M.A., Liverpool.

It was further recommended that the paper be printed and circulated among those interested in shipping.

Believing that much might be done by associating merchant officers with existing scientific societies, in an honorary manner, the writer, as Secretary to the Literary and Philosophical Society of Liverpool, brought the matter before the members. An addition to the laws was duly passed, and confirmed (*vide supra*, p. 25), to the effect that the society be “empowered to elect as ASSOCIATES, masters of vessels, or others engaged in marine pursuits, who may have peculiar facilities for adding to the scientific interest of the Society’s proceedings; such Associates to be in every case recommended by the council, and to have the same privileges as Honorary Members—their number to be at present limited to twenty-five.” This plan, there is little doubt, may be productive of much good, and it is to be hoped will be adopted by other societies. One very large and popular society in London at least, as the writer is aware, is contemplating a similar step.

The next important advance was as follows:—It being considered of the last importance that the sanction and

co-operation of ship-owners should be obtained, a meeting was convened in the Mayor's parlour, Town-hall, Liverpool, at which some of the most influential ship-owners of that port were present, as well as the Chairman and Secretary of the Mercantile Marine Service Association; Mr. T. M. Mackay, of the firm of James Baines and Co. (a gentleman ever ready to co-operate in every scheme for the good of seamen), occupying the chair. The meeting having been informed of the nature and progress of the movement, and the subject having been discussed, the gentlemen present promised their support, both nominal, and pecuniary if it were required; and the Mercantile Marine Service Association were requested to draw up some form of certificate as a reward for industry and diligence in any of the departments in which it is anticipated that they can be serviceably employed; this certificate to be signed by persons of influence to be afterwards decided upon. The Association has, since then, given the matter their attention, and they propose to request the co-operation of such scientific bodies as may wish to avail themselves of the advantages offered in this direction, and to invite them to draw up carefully prepared and lucid statements of the special subjects they may wish to have investigated.

There can be no doubt whatever that it is to the rising generation of seamen that we must chiefly look for the fruits of any scheme of improved education which may be adopted in the present day; and such establishments as the "Conway" training frigate, in the Mersey, are most powerfully useful to that end;—still, in order to collect together the elements of scientific industry and laudable ambition which doubtless exist scattered among the present body of merchant officers, it is proposed, as a beginning, to offer a certificate of merit to such commanders as hold the extra certificate of the marine board, or who keep the meteorological log book supplied by

the Observatory, or who show in various other ways a desire to improve their minds, and to encourage industry in those under their charge.

Enough has now been said and done to prove that there is a current at work, setting in the right direction, and we can only now leave the matter to time, feeling fully assured that it will go on, and bear ultimate fruit both in the Advancement of Science, and in the elevation of the character of the Merchant Seaman.

POSTSCRIPT.—The writer is glad to report that the subject has met with the approval of the Committee of Council on Education. The following communication was received from the Department:—

Science and Art Department of the Committee
of Council on Education,
South Kensington, London, W,
30th day of January, 1862.

SIR,

I am directed by the Lords of the Committee of Council on Education to request that you will be good enough to furnish me with twenty copies of your pamphlet "On the Opportunities of Advancing Science enjoyed by the Mercantile Marine," to send to all the Navigation Schools under this Department.

I am, Sir,

Your obedient servant,

NORMAN M'LEOD,

Assistant Secretary.

Dr. COLLINGWOOD,

15, Oxford-street, Liverpool.

Mr. DOBSON, head-master of the school-frigate *Conway*, exhibited a diagram, on an outline map of Europe, of the great revolving storm of the 1st and 2nd of this month, showing its position on the morning of the second instant. When a north-east gale was causing great loss of life and shipping on the eastern coasts, from Shields to Yarmouth, a northerly wind was blowing over the western part of England; the centre of the storm, with "scarcely a breath of wind and a mountainous sea," was in the middle of the German Ocean, and heavy southwesterly gales were blowing over the Baltic and North of Europe. A curve of the corresponding barometric fluctuations showed that the mercury had been falling from the 28th October, and that the centre of the cyclone passed over England just before the fatal explosion in the Shevington Coal Mine, at Wigan, on the morning of the 1st of November.

Mr. Dobson also produced a diagram of barometrical and thermometrical observations, made at Wakefield, by Dr. Milner, for the year, 1859, on which the dates of sixty-seven fatal explosions in coal mines were also marked, and showed that the batches of explosions always coincided with periods of low atmospheric pressure, or suddenly increased temperature (one group of fourteen explosions marking the twenty-three days which include the *Royal Charter* storm—there being three fatal explosions for the 26th October,) and in one striking period of six weeks in July and August, with a steady high pressure and uniform warm temperature, that explosions were only conspicuous by their absence.

FOURTH ORDINARY MEETING.

ROYAL INSTITUTION, December 2nd, 1861.

The REV. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

It was announced from the Council that it was contemplated to hold a celebration of the fiftieth anniversary of the Society, which will arrive on the 21st February next. The order of proceedings would embrace a banquet at the Town-hall, to be kindly given by his Worship the Mayor to the Council, &c. : and a *soirée* or *conversazione*, of which further particulars would be duly announced.

The following gentlemen were balloted for and duly elected members :—

Mr. S. R. GRAVES (ex-mayor),
 Mr. G. MANSFIELD BROWNE,
 Mr. W. H. WRIGHTMAN,
 Rev. S. A. STEINTHAL,
 Mr. CHARLES MULVANY,
 Mr. HENRY MULVANY, and
 Mr. WILLIAM CHADBURN.

Captain JAMES ANDERSON, Cunard service, was balloted for, and duly elected the first Associate under the new Laws of the Society.

Dr. COLLINGWOOD exhibited the “Log of the ship *Lloyd*, Nicholas Pocock, master, between Bristol and Charleston, in 1768.” This beautiful work of art, the property of Mr. C. E. Rawlins, exhibited a sketch of the ship in her daily position at noon, in two hundred finished drawings, by the captain, who was afterwards appointed marine painter to the King (Geo. III).

Dr. IHNE exhibited a curious volume of figures taken from a book lately published in France, at a price of two guineas, and which was supposed to illustrate the worship of the Phallus among the North American Indians. It had, however, been proved by German critics that these figures were merely the indecent scriblings of a badly-disposed school-boy in the backwoods; and a selection from them, containing the most characteristic, could be obtained from Messrs. Williams and Norgate, at a price of one shilling.

Dr. EDWARDS exhibited, under the microscope, a curious condition of decomposition in glass ampullæ, found in the catacombs of Rome. This decomposition presented an appearance which at one time had been supposed to be due to the blood of victims, at another to the remains of the sacramental wine, but was now proved to be owing to a chemical change which had taken place in the substance of the glass itself.

Mr. MOORE exhibited a series of skins of Birds of Paradise of the following species: — *Paradisea rubra*, *Paradisea papuana*, and *Cincinnurus regia*. These birds were collected at Mysœ, Waigon, and other islands adjacent to New Guinea, by Mr. A. R. Wallace, who has devoted several years of his life to the investigation of the Natural History of these little known regions, rich in striking and beautiful forms of animal life, among which the Birds of Paradise stand preëminent. The collection embraced a full illustrative series of the two species, *P. rubra* and *C. regia*, including the females, both of plain and sober plumage, and males at various ages, showing the gradual acquirement of the exquisitely rich and gorgeous colouring and peculiar development of feathers which only reach their full perfection after three or four moults.

Mr. MOORE exhibited a highly interesting set of fossil footprints of birds from the sandstones of Connecticut. They were from the collection of Captain Anderson, the newly-elected Associate of the Society, and consisted of three different

layers of stone, into which they had readily separated, showing as many moulds and casts of the foot of the bird, and proving that the sand deposited by three successive tides was sufficiently soft to be impressed by a single stamp of the bird's foot. They were bound like a folding map, in metal binding, in order to make the illustration more clear.

Mr. EDWARD HULL, F.G.S., of the Geological Survey, made some remarks upon these footprints, observing that they appeared to be situated in strata corresponding to those in this neighbourhood, namely, the new red sandstone between the carboniferous and triassic systems. The impressions appear to have been originally formed in a marine estuary, and afterwards filled up with a fine marl.

Mr. MOORE also exhibited photographs of the skeleton of the Gorilla, compared with that of man; and also of the restored skeleton of *Dinornis elephantopus*, an extinct gigantic bird from New Zealand, standing five feet six inches high, and having the most massive legs and feet of any bird whose existence at any period of the world's history has yet been made known. The photographs are published at the South Kensington Museum, for the trustees of the British Museum, from specimens there exhibited.

The PRESIDENT exhibited on behalf of Mr. Keen, a mass of coral taken by grapnels from a shoal near the Seychelles Islands, in seven fathoms water; also, another piece taken by means of a hook attached to a deep-sea lead, on the Aghullas Bank, near the Cape of Good Hope. When first raised from seventy-five fathoms water, it was alive with beautiful bright blue polypes, seated in bright orange cups.

A paper was then read, of which the following is an abstract:—

ON ANIMAL CHARCOAL.

By E. ERASMUS HOLDEN,

(of Widnes, near Warrington.)

LÖWITZ, of St. Petersburg, seems to have been the first to discover the disinfectant and decolorising properties of animal charcoal ; and Kels, in or about the year 1798, published an account of some experiments made with it by him upon certain syrups and dyeing materials. Guillon first refined sugar by means of charcoal, but it was undoubtedly that made from wood. The earliest practical clarifying of syrups by bone or animal charcoal, was effected in 1812, by Derosnes, whose attention had been attracted to the subject by a pamphlet published the previous year, by M. Figuier, showing that animal charcoal was far superior to that made from wood for bleaching vinegar and wines. From this time no other charcoal was used, since notwithstanding that bone and animal char were so much more costly, nevertheless, their rapidity and superiority of action finally proved that they were more economical.

In whatever form of apparatus the manufacture of animal charcoal is conducted, the process is essentially the same, and is nothing else than dry or destructive distillation ; the effect always being the carbonization of the organic tissues, and the removal of the three elements, nitrogen, hydrogen, and oxygen, in combination with some carbon, forming volatile empyreumatic compounds.

The author then proceeded to describe the various methods of charring, the most recent and improved plan being conducted in oval retorts, set vertically, charged above, and emptied from below, thus effecting a great saving both of fuel and labour, and making the carbonization proceed more regularly and continuously.

The condensation of the gases was next noticed, which was shown to be profitable to the manufacturer, notwithstanding the expense of the process.

He exhibited a sample of crude bone tar, remarking that little or nothing was known of the volatile products of the dry distillation of bones; yet they would amply repay the analytical chemist for all the trouble which might attend their investigation.

The author, after describing the granulation of the charcoal, and showing specimens of the finished article, proceeded to notice its composition, and then its properties, first, as a disinfecting, and, secondly, as a decolorising agent.

He then gave a description of the methods employed at home and abroad for the revivification of "spent char" (charcoal which has been already employed in the refining or decolorising process,) and concluded by a few remarks upon the adulterations to which charcoal is subjected, and upon some customs of the trade with respect to moisture, &c.

After the Ordinary Meeting, an EXTRAORDINARY MEETING was held, to take into consideration some minor alterations of the laws, which had been recommended by the Council, previously to reprinting them. These alterations were carried unanimously, with verbal improvements, and will be confirmed at an Extraordinary Meeting to be held after the next Ordinary Meeting (*which see*).

FIFTH ORDINARY MEETING.

ROYAL INSTITUTION, December 16th, 1861.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

The PRESIDENT, in constituting the Society, called upon the members to express the deep sympathy which they felt with her Majesty, in the loss she had just sustained, and their heartfelt regret at the untimely death of the Prince Consort. After eulogizing the public and private character of the deceased Prince, and his liberal patronage of science and art, the President said that it had been considered that it would be most in accordance with the spirit of the lamented Prince to proceed with the business of the evening, after this mark of the respect and esteem in which his Royal Highness had been held by them.

Dr. IHNE said—It may, perhaps, not be considered inappropriate to give a response from the body of the Society to the sentiments just uttered by the President. Agreeing with him in every word, and deploring the loss sustained by the Queen and by the country in the sudden and untimely death of the Prince Consort, I look upon that death as a misfortune, felt, in a special degree, by the great number of Prince Albert's and my own countrymen living in these islands. Prince Albert was looked upon by them as a noble and worthy representative of their race—as a man calculated to raise the German character in the eyes of Englishmen. He combined many of the best qualities of which the Germans are proud, and it may be said, none of their faults. He was conscientious in the discharge of his public and private duties, firm in his principles, of a serious and earnest cast of mind, laborious in his habits, abstemious in his enjoyments, always aspiring upwards

to something higher, better, nobler, and greater. Endowed with a capacity of mind and a tone of character which, had he been born a peasant's son, would have raised him to eminence as a scholar and a statesman ; he did not sink into sloth and self-indulgence merely because he was born a prince. The great qualities with which nature had bountifully endowed him, he improved by conscientious study ; nor was he bent on enjoyment alone, even in his intellectual pursuits. He had always a practical object in view, and his principal object was to benefit the country of his adoption. In this respect he showed that there is some fallacy in the popular English notion of the German character, which charges my countrymen with a want of sober judgment and practical common sense. At any rate, Prince Albert always knew what he was about, always aimed at a practical object, and was never at a loss to adopt the proper ways and means to attain it. If, with his German extraction and character, mind and education, Prince Albert, nevertheless, on all occasions proved himself a thorough Englishman, he thereby exemplified a trait in his national character with which the Germans residing in England would wish their English friends to be particularly impressed. It is that fundamental homogeneity of thought and feeling which is both a result and a proof of the original relationship of the two nations ; which has already produced important historical results, and is destined in the future to bind up the interests of united Germany and England in an indissoluble alliance ; not an alliance of hollow phrases or temporary expediency, but in a bond of union based on kindred blood and feeling. To whatever reflections the death of the Prince leads us, in every way we find reason to deplore it as a national calamity. Let us hope that his example and his teaching have produced such a result upon his royal son, that the reign of the next King of England may reflect the united virtues of Prince Albert and Queen Victoria.

It was announced from the Council that the Rev. W. Banister had resigned his seat therein, and that Mr. J. C. Redish had been elected to the vacancy.

Mr. TOWSON exhibited some specimens of malachite (native carbonate of copper), and mentioned the theory of their formation from sulphuret of copper by means of earthy carbonates. The sulphuret attracting oxygen, under the joint influence of air and moisture, is converted into sulphate, which again is supposed to be decomposed by the carbonate of lime present in the mountain regions, and converted into carbonate of copper, or the malachite. This subject being under discussion on a previous evening, the objection was started as to whether an insoluble earthy carbonate was capable of decomposing a soluble sulphate at ordinary temperatures?

Dr. NEVINS, therefore, brought before the Society some experiments in illustration of the point at issue, by which he showed that a saturated solution of sulphate of copper was entirely decomposed in the course of a few days by a mass of chalk, and was converted into solid green carbonate of copper, whilst the chalk was converted into sulphate of lime, thus showing that an insoluble earthy carbonate is capable of producing the change in the soluble sulphate which had been alluded to by Mr. Towson.

Mr. MOORE exhibited, on the part of Captain Heron, some objects which purported to be the eyes of a Peruvian mummy; eye-like bodies which are certainly found in the neighbourhood of those remains. An examination of them, however, rendered it probable that whatever their use, they were not human eyes.

Dr. COLLINGWOOD gave it as his opinion they were sections of the eyes of some fish; and it had been suggested that they were parts of the eyes of a species of cuttle.

Mr. MOORE remarked that the sockets of these mummies had been examined, and in every case the eye-ball was found in them.

He also exhibited, on behalf of Mr. Helsby, a Peruvian mummy, in the usual sitting posture, from Arica, and the contents of the tomb from which it was taken, consisting of a vast assortment of earthenware utensils of various kinds, instruments, &c.

Mr. MOORE further exhibited a very fine specimen of *Comatula glacialis*, taken from the coast of Greenland.

Dr. IHNE having taken the chair, a paper was then read by the President,

ON "MORAL INDICATIONS IN NATURE."

EXTRAORDINARY MEETING.

In consequence of the changes which had been made in the Laws of the Society from time to time, since they were last printed, in 1848, it had now become necessary to issue a new edition. Previous to reprinting them, however, they were carefully revised by the Council, who recommended to the Society the following alterations and additions, viz.:—

1. (Additional Law.) Members elected after the first meeting in February only to be required to pay half the Annual Subscription for the current Session.

2. That the term *Honorary* be substituted for *Corresponding* Members, according to the practice of other similar Societies.

3. Corresponding (or Honorary) Members to be proposed to the Society *on the recommendation of the Council*.

4. In Law 12 (relating to the privileges of Corresponding Members), to substitute the words "or vote thereupon" for "or voice in its deliberations."

5. Law 37: To strike out the words, "The sitting shall terminate at half-past nine."

6. Law 49 : All donations shall be * * recorded * * *in the Annual Report of the Council.* To substitute for the words in Italics, "in the next volume of Proceedings."

7. Page 15. Schedule A. To strike out from the form of application for admission, the words (long obsolete), *and to furnish, when called for, the Title of a Paper to be read before the Society.*

8. That Extraordinary Meetings, held after the Ordinary Meetings, commence not later than Half-past Nine.

After the Ordinary Meeting, an Extraordinary Meeting was held for the purpose of reconsidering these alterations, which had previously been passed at an Extraordinary Meeting, held after the last Ordinary Meeting. At the present meeting, the above alterations and amendments were confirmed, and became part of the Laws of the Society.

SIXTH ORDINARY MEETING.

ROYAL INSTITUTION, January 13th, 1862.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

The following gentlemen were balloted for, and duly elected members :—

ROBERT HUTCHISON, Esq., Mayor of Liverpool.
 Mr. C. E. RAWLINS,
 Mr. ARNOLD BARUCHSON,
 Mr. ENOCH HARVEY, and
 Mr. WILLIAM H. JONES.

The PRESIDENT exhibited a beautiful work, consisting of enlarged drawings, by Mrs. Bury, of Polycistins, found in the Barbadoes chalk deposit. These drawings were multiplied by photography, and gave a splendid illustration of these extraordinary organisms.

Dr. COLLINGWOOD, exhibited on behalf of Commander Leycester, R.N., the skin of a species of Ant Eater, killed near Rio. It was a specimen of the *Tamandua* Ant Eater, the middle one of the three American species in point of size, but remarkable for the very variable character of its colouring, which differs more than that of any other known animal in a state of nature.

Commander LEYCESTER also sent for exhibition a tracing of a remarkable unpublished bas-relief found by himself at Lapithus, and which attracted much attention from the singularity of its design. It was supposed to be a monkish representation of the story of Jonah. Also, a curious bronze boss of the fourteenth century, found by him in Crete.

The following paper was then read :—

AN APOLOGY FOR SHAKSPERE'S "LADY MACBETH."

By P. H. RATHBONE, Esq.

SHAKSPERE, I believe, conceived the whole life of his principal characters, imagined the circumstances under which they had been educated, pictured to himself their appearance, carriage, tone of voice, even their lightest gestures, and traced, one by one, the steps of long careers, of which he has given us only a few scenes. Therefore (as happens in real life) slight words spoken almost in jest often give us the key-note to important phases of the characters he draws. But though always consistent in his idea of the characters he delineates, and of the circumstances which surround them, he neither is, nor pretends to be, always consistent with history; and it is, as a rule, in his plays alone, that we must search for his meaning. In examining the play of "Macbeth," it is important that we should feel that *Lady Macbeth* and her husband are not placed beyond the pale of our sympathies, and that the temptation to which they succumbed was one which even a high principled man like *Banquo* had difficulty in resisting. (Act II., Scene 1.) Our respect for human life has become almost morbid, and, therefore, we can hardly conceive how, in a half-savage state of society, murder shocks the imagination infinitely less than in a more advanced stage of civilisation. Shakspeare has, however, felt that, in a more settled age, it would be difficult to realize this state of feeling, and has, therefore, with masterly skill, employed the witches to throw a weird shadow over the play, and prevent

too close a comparison with the feelings of a present age. At the period at which the play is supposed to open, the reigning king of Scotland usually named his successor, which nomination was generally, but not always, respected, because in those troublous times the crown could not be allowed to devolve on a minor. The Prince of Cumberland was the title given to the heir presumptive. (Act I., Scene 4.) It was, therefore, of the highest consequence to *Macbeth* and *Banquo*, next of kin, after Duncan's sons, that the king's reign should terminate before *Malcolm* and *Donalbain* arrived at an age to be entrusted with the government (a period which is approaching at the commencement of the play). Previously to *Macbeth's* going upon the expedition from which he is returning, as the play opens, he had suggested to his wife the murder of *Duncan*, which is proved, firstly, by his start when he is hailed king by the witches—a start of dread at his thoughts being so read; *not* of mere surprise as evidenced by *Banquo's* exclamation—

“ Good sir, why do you start *and seem to fear*
Things that do sound so fair.”

Secondly, by the direct statement of *Lady Macbeth*—

“ What beast was't then
That made you break this enterprise to me.
* * *Nor time nor place*
Did then adhere, and yet *you* would make both.”

It must be remembered that the first meeting of *Lady Macbeth* (Act I., Scene 7) and her husband is *when he announces the wished-for opportunity*. During the excitement of the military expedition, the idea, however, has slept; but the prediction of the witches recalls it to *Macbeth's* imagination; and the conviction that the plot must be consummated now or never, gives to it a dreadful reality which he has hitherto never dared to face, but which now makes his seated heart knock at his ribs against the use of Nature. (Act I, Scene 3.)

Shakspeare's *Lady Macbeth* I imagine to have been a slight, delicately formed, pretty little woman, with quick bright eyes and most fascinating manners. In age, about twenty-five. She has had one child, and has lost it. (Act I, Scene 7.) Her imagination, defective in breadth, clings all the more tenaciously to any idea once embraced. Justice is, as a rule, unknown to either women or to uncivilised men, a feeling of clanship superseding it. In *Lady Macbeth*, this feeling culminates in a passionate devotion to her husband, rendering her blind to the claims of all the rest of mankind; nor is *Macbeth* unworthy such devotion. In the "May of life" (Act V., Scene 3, Collier's correction), brave, with all the genius necessary for a successful commander, of remarkably graceful manners (witness his thanks to *Rosse* and *Angus*, Act I., Scene 3), of a brilliant and daring imagination (which would all the more impress her from her own want of that faculty), there is, in fact, only his defect in resolution, which is likely to detract from her almost adoration of him. This defect results, to a great extent, from excess of imagination, and she, therefore, cannot in the least understand it. Long accustomed to worship the plans he devises, and to stimulate him in carrying them out, she does not stay to consider the character of this particular one. She has every element of genius, except imagination, inclusive of a high and daring will, and is married to a man who supplies her only intellectual want, while she feels she can strengthen him in the weakest part of his character. In Act I., Scene 5, we find her attempting to explain his defect of will by over conscientiousness, but, finally, the woman's shrewdness over-balances the wife's affection, and she confesses that he

"Would not play false,
And yet would wrongly win."

Duncan's approach is now announced, and then follows that passionate attempt to quench every claim of our common

humanity in the fanatical affection of the wife ; an attempt so fearfully successful. It makes one's blood boil to watch the cold, calm, solemn tone in which this speech is usually *recited* on the stage, instead of being, as it were, gasped out as the expression of a struggle almost too strong for the frame which has to endure it. On *Macbeth's* entrance, her wonderful self-mastery displays itself ; and from this time she never swerves for a moment from her resolution. The unlooked-for opportunity which he comes to announce, inflames her somewhat meagre imagination, while, by a stroke wonderfully true to nature, it somewhat disappoints his richer one, and he begins to doubt and hesitate. The subject has been too often discussed for words to be wasted on it now ; and a slight hint by *Lady Macbeth* as to the tale to be read in the too mobile countenance of her husband, betrays the perfect understanding between them.

During the supper (Act I., Scene 7), she exercises over the old king the enchantment of manners, always full of fire and dignity ; but now possessing a weird-like fascination, partly arising from the action of stimulants—

“ That which hath made them drunk hath made me bold.”

Act I., Scene 2.

and partly from the exhilaration produced by a sense of the danger about to be incurred ; partly, also, from the intense artistic enjoyment of the part she is acting. Histrionic art is the only art in which woman can compete with man. First-rate female painters, sculptors, musicians (composers), or poets, there have not been, and probably, never will be ; but first-rate actresses we have had, and may hope for again. A woman's enjoyment of the only realm of art wherein she is mistress is proportionably intense and absorbing ; and not always on the stage is it that the finest actresses have played their parts.

Lady Macbeth misses her husband, and, doubting the cause of his absence, she breaks in upon his ruminations, and, with flashing eyes and heightened colour, the very incarnation of passionate beauty, she stings him by the taunt that the love of an irresolute man is not worth possessing. He feels the full force of it, hence the reply—"I dare do all that may become *a man*, who dares do more is none," which touching Tupperism is effectually disposed of by—"What *beast* was it, then, that made you break this enterprise to me;" and then comes that fearful allusion to her dead child, which she uses as the very strongest hyperbole her excited brain can coin to express her scorn for any wavering in a resolution once taken, and which is therefore no proof of her being wanting in natural motherly affection, but the reverse. Silence now falls upon the castle—the king, entirely captivated by the lovely and fiery little demon who is compassing his death, lies "shut up in measureless content," (Act II., Scene 1,) having sent with most unnecessary haste "great largess to all the offices," and a diamond to the lady. *Macbeth*, left alone, becomes a prey to his ever-active imagination, which conjures up the air-drawn dagger, and paints to him the enormity of the crime in a hundred forms, making him realize the nature of it most intensely. Throughout the murder scene, *Lady Macbeth's* nerves are also tried to the utmost, but *solely through fear of discovery and failure*. How completely family affection has absorbed her other duties also appears in this scene. She would have stabbed the old man herself "had he not resembled her father." (Act I., Scene 2.) She had no objection to murdering her king, but would prefer that she herself should not lay hands upon "the likeness of her father." As soon as the necessity for exertion is past, her nerves give way, and she faints away as was naturally to be expected. (Act II., Scene 3.) There is no pretence about this fainting, as commentators have sometimes suggested.

Probably, the events of that night might in any case have left permanent traces upon her nerves. The restless imagination of *Macbeth*, which renders him daily more morose, fitful, and tyrannical, is, however, what wears out her heart and life, and not remorse, which upon a close examination of the text it will be found does not trouble her. This irritability upon the part of her husband only serves to bring out her unwavering devotion to him. In Act III., Scene 2, while herself the prey to the deepest depression, she has nothing but words of cheerfulness and encouragement for him. The terrors of his imagination are gradually inducing in him an insane thirst for blood; but he forbears to communicate his schemes to his wife lest she should dissuade him from them. "Be innocent of the knowledge, dearest chuck." (Act III., Scene 2.) In the Banquet Scene, Act III., Scene 4, *Lady Macbeth's* grace as hostess, her nerve and presence of mind during her husband's aberration, and the dignity with which she recalls him to himself, are most striking; still more remarkable is the touching and considerate affection with which she refrains from all remark when they are left alone, after he has "broke up the good meeting in most admired disorder," and contents herself with dropping in a soothing expression between his wild speeches. Few wives could have refrained from some bitter observation under the circumstances. *Macbeth's* terror at *Banquo's* ghost, and his passionate assertion that *he* did not do it, may be accounted for by his having been himself in disguise—the third murderer in the previous scene. There is no explanation of how that third murderer came to join the other two. He first hears the sound of horses, knows *Banquo's* habits, first points him out, and discovers that *Fleance* has escaped. It was natural that *Macbeth's* jealous and suspicious mind should urge him to this step.

The last time we see *Lady Macbeth*, Act V., Scene 1, some 15 years have past since that fearful night of the king's murder;

and, every year, the once high-spirited, generous, and courtly *Macbeth* has become more blood-thirsty, meanly jealous, and morose. With no children, and with a husband who, instead of a support, is a drain upon her strength, she finds herself, at the age of forty, alone with the terrible shadows of the past. No wonder that in the end her brain gives way. How touching is her allusion to the beautifully formed little hand, so unfitted for the work which it had set itself to do. This sleep-walking scene ought, it appears to me, to be represented with a far more quick, nervous, scared vehemence than is usually the case. So *Lady Macbeth* disappears, and we hear casually that the overburdened heart has given way, and that self-administered poison has ended her days. (Act V., Scenes 5 and 7). Let me conclude by remarking—

Firstly, that I deduce *Lady Macbeth's* age from the fact that her character is too decided for her to be much under twenty-five at the opening of the play. On the other hand, *Macbeth's* evident expectation of a coming family (Act I., Scene 7) ; and the terrible suspicion which arises afterwards, that “for *Banquo's* issue have I filed my mind” (Act III., Scene 1), shows that she probably was about that age. Secondly, *Lady Macbeth* could hardly have been the large masculine woman she is often represented to be, or the terms that *Macbeth* throughout applies to her would be absurdly inappropriate, *e.g.*, a man would be a fool who called a woman six feet high “Dearest Chuck.” (Act III., Scene 3.) Thirdly, it may be objected to the limited character of *Lady Macbeth's* imagination that many of her speeches display the highest poetry. To which I reply, that the language of strong passion is always that of poetry, but not necessarily that of creative imagination, and it may be observed that *Lady Macbeth's* thoughts always dwell upon what has happened, or upon what she has determined shall happen, and never upon what may happen without her agency ; whereas, her husband's imagina-

tion, on the contrary, rather dwells upon the latter than upon the two former. Ghosts, witches, or air-drawn daggers, have little or no influence upon her realistic mind. Fourthly, her character does not suffer the same degradation from the original crime as her husband's does. The class of crimes which degrade men's characters and those which degrade women's are quite distinct.

Finally, I say, that when we consider the end of this woman in what should have been the prime of her life, when we reflect upon her fascinating beauty, her courage, her strong affections, and generous self-devotion, we must acknowledge that, fearful as was her crime, springing, as it did, from idolatrous devotion to her husband, and lamentable indifference as to the means by which she procured his advancement, the retribution was even more terrible, and we can hardly refuse to append to our verdict of guilty, "recommended to mercy."

The Rev. J. ROBBERS could not agree with the essayist in the view taken of *Lady Macbeth's* character, so different to the popular estimate of it. He thought Mr. Rathbone laid too much stress upon *Macbeth's* start at the news communicated by the witches, which he conceived was one of astonishment. He also conceived that *Lady Macbeth's* invocation, commencing "The raven himself is hoarse," contained the highest poetry, and that, therefore, the essayist was not justified in saying that *Lady Macbeth* was wanting in imagination. He also criticised several portions of the paper with a view to show that some of the passages were capable of a different signification to that attributed to them.

Mr. CLARK also thought the essay took too favourable a view of *Lady Macbeth's* character, but was disposed to think that the popular estimate erred on the other side, the truth being somewhat between the two. He did not believe that the idea of murder was present in *Macbeth's* mind previous to meeting the witches, and saw no reason to suppose that he had previously discussed the subject with *Lady Macbeth*.

The Rev. A. STEINTHAL was more disposed to agree with Mr. Rathbone's view than the previous speakers, especially as regarded the previous intention of *Macbeth*, and pointed out that *Lady Macbeth* alluded to her husband as having "sworn to this," as if he had taken a solemn resolution some time previous.

The PRESIDENT thought no woman with the strong affections attributed in the essay to *Lady Macbeth*, could have used such opprobrious terms in speaking to her husband, and, also, that her dreadful allusion to her readiness to dash her infant's brains out, "had she so sworn," was inconsistent with the view taken of her. He had been reading with great interest Bucknill's study of *Macbeth's* character, and was struck with what was pointed out there as to the increase of mental disease as the play went on. *Macbeth* knew that the air-drawn dagger was a figment of his imagination, but did not recognise *Banquo's* ghost as such.

Dr. COLLINGWOOD had not been shaken in his previous view of *Lady Macbeth's* responsibility. The first idea of murder mentioned by the poet originated with her, and in this Shakspeare appears to have followed history, particularly Hollinshed. Throughout the play, no trace of compunction was visible in *Lady Macbeth*, except we so consider the passage—

"Had he not resembled
My father as he slept, I had done it."

Macbeth's character, on the other hand, previous to his temptation, was summed up by *Lady Macbeth* in the words—

"What would'st thou *highly*, that would'st thou *holily*."

He was not inclined to attribute so much importance to *Macbeth's* start, which might have followed the announcement of his being *Thane of Cawdor*, as much as the succeeding, "that shall he *King* hereafter."

Mr. RATHBONE, in reply to Mr. Robberds, said the language of passion, when articulately expressed, was always that of poetry, but not necessarily of imagination, and dwelt upon the characteristics of imagination, showing where these were wanting in *Lady Macbeth's* speeches. He also went into further proofs of assassination having been originated by *Macbeth*, and not by his wife; and replied to Mr. Higgins's remark, that at the time *Lady Macbeth* alluded to her child, her brain was unnaturally excited, both by stimulants and by the mental strain to which it was subjected.

SEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, 27th January, 1861.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

Mr. GILBERT G. WALMSLEY was elected a Member, and Captain MORTIMER, late of the American ship *Florida*, an Associate, on the recommendation of the Council.

The SECRETARY made a statement with regard to the Jubilee Festival of the Society, which had been announced in the last circular for the 25th and 26th of February, but had since been postponed a fortnight. The Society will complete its fiftieth year from the foundation, on the 21st of February,* and it was intended to hold a commemoration festival. The Mayor had kindly offered to entertain the Council and a proportion of the members at a banquet to be given at the Town-hall, on Tuesday evening the 11th of March; and on Thursday evening, March 13th, it was intended to hold a *soirée* in the Town-hall rooms, of which further particulars would be duly announced.

A paper was then read by the Rev. J. ROBBERDS, B.A., on
 “THE CONSTITUTION OF THE UNITED STATES.”

* The preliminary meeting of the Founders of the Society was held on Feb. 21st, 1812, but the Society was constituted on the 18th March following, when the original members met, and signed the newly-framed Laws.

EIGHTH ORDINARY MEETING.

ROYAL INSTITUTION, 10th February, 1861.

The REV. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

It having been announced that the arrangements proposed by the Festival Committee would be submitted to the Society for confirmation, the SECRETARY briefly stated the plan proposed for the celebration of the jubilee of the Society, which occurs on the 21st instant, and which will be duly commemorated next month. It was stated that his Worship the Mayor had kindly intimated his intention of inviting the Council of the Society, and a number of the members, to a banquet at the Town-hall, on Tuesday evening, March 11th; but, in order to give all the members an opportunity of joining in the celebration, the committee had made arrangements for a *soirée* to be held in the Town-hall, on the evening of Thursday, 13th March. To this *soirée* the admission would be by tickets to be issued to members only, and the price of which would be, for gentlemen 7s. 6d., for ladies 5s.; and each member would receive on application as many tickets as he required for himself and his friends. It was further proposed that the Society should invite strangers interested in literature or science; and for this purpose, as well as for covering extraordinary expenses, a subscription had been opened, to which members were requested to contribute. It was further stated that the amount of the fund so raised would necessarily regulate the number of invitations issued, as well as the general scale of the entertainment. The programme of the proceedings was not yet completed, but it was understood that there

would be a very fine collection of works of literature, science, and art, as well as excellent music ; and, altogether, the Committee hoped to be able to afford a very gratifying and agreeable evening's entertainment. The Society having been informed of the plans of the Committee, as far as at present elaborated, agreed to the resolution.*

The following gentlemen were balloted for, and duly elected members of the Society—

Mr. JAMES SPENCE,

Commander LEYCESTER, R.N., F.R.G.S.

Dr. ROGERS, Rainhill, and

Mr. J. H. WEIGHTMAN.

Mr. W. HARRISON, of Kirkdale, exhibited a remarkable living specimen of the common earthworm, bifurcated through half its length.

The following paper was then read :—

* An account of the Jubilee Festival will be found in an Appendix, at the end of the volume.

THE ANCIENT GOTHIC LANGUAGE, AND ITS PLACE IN THE INDO-EUROPEAN FAMILY.

By J. A. PICTON, F.S.A.

At the recent meeting of the British Association in Manchester, a paper was read by the chairman of the Ethnological Section, on the "History and Origin of Language," which attracted considerable notice, and was honoured by a leading article in the *Times*. The paper was remarkable, not so much for what it contained, as for what it did not contain. Views may differ, and it is quite competent for an essayist to deny all connexion between the languages of the East and those of Europe, and to treat the origin of language as a thing altogether capricious and abnormal, but that a paper of the kind should be read at a scientific congress of the present day, adopting Adam Smith as a great authority in Philology, and utterly ignoring the progress of the last half-century, is indeed marvellous; and still more so, that the hearers seem to have been quite as much at sea as the writer, nothing appearing in the report of the discussion to intimate that those who took part in it were at all familiar with the great works which have thrown so much light on Comparative Philology of late years. This is to be lamented, indicating, as it does, the feeble hold which the subject has taken on public attention in this country. In Germany, the case is very different. From the time when the two Schlegels first drew attention to the Sanskrit and Persian languages as throwing light on the origin of the European tongues, there has been a constant succession of able writers who have investigated with a patience and profundity known only to the German race, the

principles and relations of the various languages of Europe and the East. The works of Adelung, Bopp, the brothers Grimm, Lassen, Burnouf, Diefenbach, Meidinger, Graff, Zeuss, Pott, Gabelentz and Lœbe, and others, have brought together a copious mass of materials, and thrown a flood of light on the nature, history, and connexion of language. In French, the works of Raynouard, Rénan, Nodier, and especially of Professor Pictét of Geneva, deserve honorable mention. In our own country, Dr. Pritchard divides with the Schlegels the honour of having first introduced the subject. The late Professor H. Wilson, and the present Professor Monier Williams have opened up the study of Sanskrit to the English student. Dr. Donaldson has done much to illustrate the Philology of the classical languages. Dr. Latham has devoted himself to the illustration of our mother tongue. Bosworth, Thorpe, and Kemble, have rendered easy the study of the Anglo-Saxon, and Max Müller, at the present day, stands in the van of the earnest students of the Science of Language, in its general aspects.

From the mere desultory acquisition of separate languages, Philology begins to assume the character of one of the exact sciences. The keen searching power of modern analysis, brought to bear on the mass of facts previously accumulated, has gradually elicited order out of chaos, has demonstrated the existence of fixed law where irregularity and caprice had been held as dominant, and has discovered relationships heretofore unconceived between the most distant races of mankind.

If Geology teaches us to read the history of our planet in its wondrous revolutions, and in the succession of organised beings previous to the advent of mankind, the Science of Language takes up, so to speak, the thread of the narrative where Geology ceases to inform, and, far beyond the first dawn of history, reflects a light, obtainable from no other source, on the earliest condition and the progress of the human race.

I am not about to enter on so wide a field as that of the origin of language. This may be difficult of solution, and, perhaps, impossible ; but the comparison and correlation of the various languages spoken by the human race, is a subject of inquiry clearly within our range, which has led to very important results, and may lead to still greater.

The Gothic language, on which I propose to offer a few remarks, is interesting on many accounts. It is closely allied to our own tongue, and if not standing in the exact position of direct ancestor, it is, collaterally, very slightly removed from that relation. It occupies, also, a very central position in relation to the other Teutonic tongues ; connected with the Norse, the old German, the old Saxon, and Anglo-Saxon, it indicates the point from which they all radiated before settling into separate dialects.

In examining any of the languages of the Teutonic family, in the earliest forms which have been handed down to us, nothing is more remarkable than the indications of degradation and breaking down which they present. Partial and imperfect inflexions ; deficiencies and anomalies in the parts of speech, the syntax, and the modes of expression, meet us at every turn, whilst the regularity of other parts points to a period of completeness which no longer exists. In fact, the further we go back towards the original stem, the more pure and perfect does the language appear. The Anglo-Saxon having been the longest separated from the parent stem, presents the greatest amount of confusion and deficiency at the time when we first find it committed to writing. The Gothic, having been, probably, the earliest committed to writing, gives the strongest marks of its original complex character and eastern origin. There is little doubt that the Sanskrit, though not the parent tongue itself, stands in closer connexion with it than any other language. Now, the Gothic has, on the one hand, a strong affinity with the Sanskrit, and on the other, its

connexion with all the branches of the Indo-Teutonic family is close and palpable. Hence its value in relation to the origin and history of the English, German, and their sister tongues. Again, as the Gothic language was committed to writing before the separation of the North Gothic, or Scandinavian, from the congenital dialects, we find the Suio-Gothic and Mæso-Gothic so closely resembling each other as to shew very clearly the intimate relation between them. The fact, also, of the language having been lost for several hundred years, and restored by the accidental discovery of a mutilated version of the Holy Scriptures, imparts a degree of interest to the study almost romantic.

I will commence by a slight glance at the history of the people by whom the language was spoken.

Beyond the slight notices in the classical writers, the principal original authorities are Cassiodorus, and Jordanes or Jornandes. The main facts of Gothic history have been so well epitomized by Gibbon in the tenth chapter of the "Decline and Fall," that a mere allusion is all that is necessary for our present purpose. Rejecting mere tradition, we find the Goths, in the time of Tacitus, established on the southern coast of the Baltic, near the mouth of the Vistula, associated with the Vandals, a kindred race. From thence, early in the third century, they appear to have moved eastward to the shores of the Euxine, and in the reign of the Emperor Philip, they crossed the Danube and invaded the Roman province of Dacia. At the same time, they extended their conquests to the north of the Euxine, and obtained possession of the Crimea, which they held for a long period. In the year 272, by consent of the Emperor Aurelian, the Ostrogoths settled in the provinces of Dacia and Mæsia, and acquired habits of a more permanent and civilised character. Towards the latter end of the fourth century, pressed by the advancing hordes of the Huns from the eastward, the bulk of the nation, under the

name of Visigoths, or Western Goths, moved westward, and becoming embroiled with the decaying Roman Empire, carried devastation through the provinces, invading Italy and penetrating as far as Gaul. The imperial city of Rome was sacked by Alaric ; but, for a short time, the fate of the Empire was postponed by an ignominious payment of tribute. The Visigoths founded kingdoms in Aquitaine, and in Spain, and, it is probable, penetrated much further to the North. About 489, the Ostrogoths, led by Theodoric, advanced from Mœsia into Italy, and founded the Gothic Italian kingdom, which flourished for about a century, being, in its turn, superseded by the Lombard invaders.

The influence of the Goths in Europe during the fourth, fifth, and sixth centuries, was very powerful, somewhat resembling that of the Normans at a later period, but on a wider field. It was equally brilliant, but equally transient in its duration.

The Ostrogoths, in Mœsia, became a settled and cultivated people. It was here, about the year 360, that their Bishop Ulphilas made his translation of the Scriptures. Although this is nearly the sole remnant of their language and literature, there is reason to believe that the Goths were by no means the rude savages they are sometimes represented. According to Jordanes, poetry was cultivated among them, and the exploits of their heroes were celebrated in verse. Our English words "song," and "lay," are of Gothic origin. They are represented as having a series of written laws, termed by the Latin writers "Bellagines ;" Gothic, *Bi-lageins*—things laid down, settled. They are also stated to have been instructed in natural and mental philosophy, logic, and astronomy. In addition to Bishop Ulphilas, we have the names of several Gothic writers of the sixth century, Athanarit, Hildebald, Markomir. Cassiodorus and Jordanes, though they wrote in Latin, were both of the Gothic race.

The flourishing period of the Gothic language was only short. In Mœsia, the advancing tide of the Huns soon reduced the Goths to a subordinate people, but the language continued to be employed. In the ninth century, we have the evidence of Wilfred Strabo that Gothic was still spoken, and divine service celebrated in the language in some of the provinces. Even in the sixteenth century, Olaus Rudbeck relates that traces of the Teutonic tongue still lingered in Wallachia. The settlers in the Crimea appear to have clung the longest to the language. The Brabant friar, William de Rubruquis or Ruysbroeck, who travelled in the country in the year 1253, gives this slight notice, *inter quos erant multi Gothi, quorum idioma est Teutonicum*. Guiseppe Barbaro, ambassador from the republic of Venice to Asoph, in 1436, mentions that the Gothic inhabitants spoke a Teutonic dialect, which a German servant in his employ was able to understand. Busbequius, who was ambassador from the German Emperor to Constantinople in 1557-64, states that he there made the acquaintance of two persons of the Gothic race, who were on a mission from the Crimea to the Ottoman Porte, and furnishes a list of words picked up from them. The most part of these are common to the German and Gothic, but some are, without doubt, pure Gothic. This is the last notice of the Gothic as a spoken language, and from this time all traces of it disappear.

At the latter end of the sixteenth century, the manuscript called the Codex Argenteus was discovered by Antony Morillon, in the monastery of Werden in Westphalia. It is of quarto form, written on purple parchment, with gold and silver letters, and is supposed to be of the end of the fifth, or beginning of the sixth century, of Italian origin, at the period of the Gothic kingdom of Italy. Out of three hundred and twenty leaves, of which the MS. was originally composed, one hundred and

eighty-eight were remaining at the time of its discovery, since which eleven leaves have been stolen. The Codex Argenteus contains only portions of the Gospels. After passing through several hands, it was finally purchased in 1655, by Christina, Queen of Sweden, and deposited in the university of Upsala. Other MSS. have since been discovered at Wolfenbüttel, and in the Ambrosian Library at Milan, which extend the extant portion to nearly the whole of the New Testament, and a few fragments of the Old. Some difference of opinion existed amongst the learned at the time of the discovery as to the language of the MSS. and their dates, Lacroix and Wetstein maintaining that the language was that of the Franks. This question has been ably set at rest, with the aid of further discoveries, by Ihre and subsequent writers, who have fully established the integrity and authenticity of the MSS. The language was common to the several tribes of the Goths, the Gepidæ, Vandals, and Heruli, who, according to Procopius, all spoke the same tongue.*

The first edition of Ulphilas was edited by Francis Junius, and published in two quarto volumes (Dort, 1665, and Antwerp, 1684); since that time many editions have issued from the German and Swedish press, the interest in the subject having greatly increased of late years, owing to the progress of philological inquiries.

In our own country, some valuable observations and notes were contributed by Marshall to the first edition of Junius; and, in 1750, an edition commenced by Benzel was completed by Dr. Edward Lye, and published at Oxford. In the edition edited by Ihre, and published in 1773, by Büsching, of Berlin, some valuable critical observations are inserted by John Gordon, advocate, of Edinburgh.

The learned Dr. George Hickes, at the latter end of the

* "φωνή μία γοτθική λεγομένη."

seventeenth century, called public attention to the Gothic language.*

During the last century, a single volume is the sole contribution of the English press to this subject. In 1807, the Gothic text of St. Matthew's Gospel was published with a translation by the Rev. S. Henshall. (London, 8vo., 1807.) † For the last half-century, during which the German press has been teeming with editions of the text and illustrations of the language, the subject appears, amongst ourselves, to have dropped altogether out of sight, and been forgotten.

The question may very naturally be asked, what there is peculiar to the Gothic language which renders it more worthy of attention than any other Teutonic dialect, and what there is in it to repay the philological student for the time and effort bestowed on its acquisition. The question is a natural and proper one, and is capable of a satisfactory reply.

The Indo-European languages, or branches of the great Aryan stock, as it is the custom of late to call them, are connected together by various links of similarity both of form and substance. Let us confine our attention at present to two of the leading families, the Classical and the Teutonic, the former embracing the Sanskrit, the Greek and Latin, with their derivative tongues, the latter comprising the Gothic, Old German, Old Saxon, Anglo-Saxon, Old Norse, with their modern descendants. Between these two families there is considerable connexion in the vocabulary, and in the grammar to a certain point, from which they diverge, until the traces of resemblance at last became faint and few. The classical

* "Institutiones Grammaticæ Anglo-Saxonicæ et Mœsogothicæ." 4 vols. Oxford, 1689.

† "Thesaurus Linguarum veterum Septentrionalium." 2 vols. fol. Oxford, 1705.

‡ Of this performance Gabelentz and Loebe thus speak—"Ad textus emendationem non solum nihil contulit, sed etiam falsis verborum distractionibus aut copulationibus, eum fœde maculavit; annotationes autem textui subjectæ tam sunt perversæ atque ineptæ, ut quæ commemorantur non sint dignæ."

tongues continued to cling to the original forms more or less modified, which are found fully developed in the Sanskrit. The Teutonic tongues present unmistakeable marks of abrasion and degradation from their original condition, and of a re-formation, self-developed, and entirely different in character from the primitive system. In most of the Teutonic tongues, especially the modern ones, this self-developed system has been again so far broken down that it can only be discovered by a careful system of induction and inference. In the ancient Gothic language, we see the process going forward under our eyes, the old inflexions and forms giving place to the new, the deficiencies caused by time and accident being replaced by a growth from within, which has come at length almost entirely to supersede the old throughout the whole Teutonic family. According to Professor Bopp, "the Gothic language holds, so to speak, the middle place between Sanskrit and German." "It is the true starting point and guiding light, the real basis of German grammar, the German Sanskrit."

In order to illustrate more clearly the relation of the Gothic language to our own, let us take a single sentence and trace it back at intervals of about five hundred years from the present time to the middle of the fourth century of our era. I will take the first verse of the tenth chapter of St. John's Gospel. It stands in our authorised version, thus—

"Verily, verily, I say unto you, He that entereth not by the door into the sheepfold, but climbeth up some other way, the same is a thief and a robber."

It may be objected that this is really not English of the present day, having been written two hundred and fifty years since ; but, practically, it is good idiomatic vernacular of the present time. With the exception of the exclamation "verily," every word is in daily use amongst us, and with the exception of one word "entereth," it is all pure Teutonic. Let us now go back five hundred years. In Wicliffe's version of the

New Testament, written during the latter half of the fourteenth century, we find it as follows—

“Treuly, treuly, I seye to you, he that cometh not in by the dore into the foolde of scheep, but steyeth up by another weye, he is night thief and day thief.”

In this case very little of the language is obsolete. “Night thief,” and “day thief,” though quaint, are very fair equivalents for the terms used in the Vulgate, “fur,” and “latro.” The only obsolete word is “steiyeth,” and it is strange how this word, which is found in one form or other in every Teutonic language, and even in Greek, should have dropped out of use, expressing, as it does, one of the simplest and commonest ideas, that of motion forward or upwards. Going back another five hundred years, we quote from the Anglo-Saxon version, which may fairly be dated about the middle of the ninth century—

“Soth ic secge eow, se ne gæth æt tham geate in to sceapa falde, ac styth elles ofer, he is theof and sceatha.”

Here, the change in five hundred years appears considerable, aggravated as it is by the difference of spelling, but the language, in all essentials, is precisely the same. In addition to the verb “styth,” which is common to this and Wicliffe’s version, the only obsolete word is “sceatha,” robber.* Every other word in the sentence is in common use among us at the present day.

Let us now go back another five hundred years, which brings us to A.D. 360, beyond which our knowledge of the Teutonic tongues, as such, utterly fails. The passage in the Gothic version of Ulphilas stands thus—

“Amen, amen, qitha izvis, saei inn ni attgaggith thairh daur in gardan lambe ak steigith aljathro, sah hliftus ist jah vaileddja.”

* This indeed can hardly be said to be obsolete. Our word “scathe,” to injure, to harm, is the verbal form of the same radical.

This, at first sight, appears uncouth and unintelligible ; but a slight analysis soon removes the difficulty. "Amen" is taken from the Greek, untranslated. "Steigith" is common to the Gothic, Anglo-Saxon, and Old English. "Ak," but, is common to the Gothic and Anglo-Saxon. "Jah," and, exists in the Old Saxon and Old High German. The remaining words, though changed in form, are radically extant in English of the present day. "Qitha," is the first person singular, present tense of the verb "qithan," to say, which is preserved in our phrase, "quoth I," "quoth he." "Izvis," is radically the same as the Saxon "eow," English "you ;" "saei," and "sah," are the relative and personal pronouns which correspond to "se" and "he" in Anglo-Saxon, and are all derived from the Sanskrit "sa," Zend "ha." At-gangeth is sufficiently intelligible, and would be good Yorkshire at the present day. "Thairh daur in gardan lambe" scarcely needs explanation ; "through the door into the garden of lambs" is a very slight variation from our own version. "Aljathro" is an inflection of the word "alis," A.S "elles," English "else," combined with "thro." "Hliftus," thief, still exists in our terms "cattle-lifter," "shop-lifter." "Vaiddedja," literally woe-doer, sufficiently explains its relationship. Every word but one in the sentence thus exhibits its identity with the English, through the Anglo-Saxon.

Every language may be looked at in two aspects. We may direct our attention to its substance as shewn in its vocabulary, or we may study it in its form, as exhibited in its inflexions and grammatical system. I propose to take a glance at the Gothic language under both aspects ; but the very limited space at my disposal renders it necessary to confine myself at present to one only, of which I can give but a slight and superficial sketch.

I will commence with the grammatical forms, confining

myself on the present occasion to the relations of the Teutonic to the Sanskrit and Classical tongues.

The noun first claims our attention. There is a remarkable similarity in the original inflexions of the noun throughout the Aryan family of languages. In the Teutonic branch, the Gothic is the one which exhibits the most complete system of case endings. The sister tongues, evidently identical at the outset, gradually broke down and lost their inflexions, until, in the modern languages, both Teutonic and Romance, the case endings have almost entirely disappeared.

The Gothic has two classes of declensions, called by Grimm the strong and the weak ; by others, the vowel and consonantal, from a theory that the crude forms in each case ended, respectively, in a vowel or a consonant. There are four declensions in the vowel class, and two in the consonantal class.

I can only give a single specimen to exhibit the close connexion of the inflexional system of the whole family.

The Gothic, like the Greek, has five cases, the ablative of the Latin being deficient ; but it resembles the latter in wanting the dual number of the nouns.

The first declension masculine of the vowel or strong class is as under :—

CRUDE FORM—"FISK" A FISH.

| | | |
|-------------|---------|-----------------------|
| <i>Nom.</i> | Fisk—s | <i>Plural fisk—6s</i> |
| <i>Gen.</i> | Fisk—is | fisk—e |
| <i>Dat.</i> | Fisk—a | fisk—am |
| | Fisk— | fisk—ans |
| | Fisk— | fisk—6s |

is with the Latin "Pisces." The crude name in each language, the Gothic F being g to Grimm's law of phonetic change, to

| | <i>Sing.</i> | <i>Plu.</i> |
|-------------|--------------|-------------|
| <i>Nom.</i> | Pisc—es | Pisc—es |
| <i>Gen.</i> | Pisc—is | Pisc—ium |
| <i>Dat.</i> | Pisc—i | Pisc—ibus |
| <i>Acc.</i> | Pisc—em | Pisc—es |
| <i>Voc.</i> | Pisc—es | Pisc—es |
| <i>Abl.</i> | Pisc—e | Pisc—ibus |

Let us now compare the declension of the same crude form in Greek : *

CRUDE FORM ΊΧΘΥ or FIXΘΥ.

| | <i>Sing.</i> | <i>Dual.</i> | <i>Plu.</i> |
|-------------|--------------|--------------|--------------|
| <i>Nom.</i> | Fixθῦ—ς | Fixθυ—ε | Fixθυ—ες |
| <i>Gen.</i> | Fixθῦ—ος | Fixθυ—οιυ | Fixθυ—ων |
| <i>Dat.</i> | Fixθυ—ϊ | Fixθυ—οιυ | Fixθῦ—σιν(υ) |
| <i>Acc.</i> | Fixθῦ—ν | Fixθυ—ε | Fixθῦ—ς |
| <i>Voc.</i> | Fixθῦ— | Fixθυ—ε | Fixθυ—ες |

We find here such a strong resemblance, that, if not amounting to entire identity, it at least points to a common origin. It is here that the study of Sanskrit comes in to unite these scattered elements, and to throw light on the original unity from which these languages have all diverged. I cannot go into the question of the antiquity of the Sanskrit language, or the indications of its close connexion with the original Aryan tongue. I would merely observe that one mark of high antiquity is the absence of governing particles. The relations of words are almost entirely marked by inflexions. The nouns have eight cases ; in addition to those common to other languages and the Latin ablative, there are the instrumental and locative, indicating the use of the subject and its place. For instance, if I say, “The man cooks the food with

* Although the ι in ιχθῦς has the smooth breathing, all analogy leads to the inference that it was originally preceded by the digamma or F. The dental aspirate θ, which answers to the s in the other languages comes after the guttural instead of before it. This transposition is common in the Greek language, as σέπτο-μαι, Latin specto.

(by means of) the fire," the Sanskrit expresses it, अन्नं
अग्निन पचति नरः "Annam *agnina* pachati narah;"
agnina being in the instrumental case. If I say, "The
man cooks the food at the fire," it will be अन्नं अग्नौ
पचति नरः "Annam *agnau* pachati narah;" *agnau* being
in the locative case.*

There is considerable uncertainty about the Sanskrit equi-
valent for the crude form *Fisk* or *Pisc*, which we have traced
through the Teutonic and classical branches. *Pis* or *Pés*
in Sanskrit signifies rapid motion—a root which is found
in the Anglo-Saxon, *Fys-an*; Norse, *Fys-a*; to hasten, to
move quickly. Pictét (Origines Indo-Europ. sec. 47) main-
tains that the correspondence of the Latin *Pisc* with the
Cambrian *Pysg*, proves the existence of a primitive crude form
Pisk.† Assuming this to be the case, it would belong to the
eighth class of Sanskrit nouns, and would be thus declined:—

| | <i>Sing.</i> | <i>Dual.</i> | <i>Plu.</i> |
|--------------|--------------|--------------|-------------|
| <i>Nom.</i> | Pisk—(s) | Pisk—au | Pisk—as |
| <i>Gen.</i> | Pisk—as | Pisk—os | Pisk—ám |
| <i>Dat.</i> | Pisk—e | Pisg—bhyam | Pisg—bhyas |
| <i>Acc.</i> | Pisk—am | Pisk—au | Pisk—as |
| <i>Voc.</i> | Pisk— | Pisk—au | Pisk—as |
| <i>Abl.</i> | Pisk—as | Pisg—bhyam | Pisg—bhyas |
| <i>Inst.</i> | Pisk—â | Pisg—bhyam | Pisg—bhis |
| <i>Loc.</i> | Pisk—i | Pisk—os | Pisk—su |

It will be seen that the Sanskrit noun contains the whole of

* It may be observed in passing, that out of these four Sanskrit words three
are quite familiar in other connexions. अग्निम् "Agni" is the Latin "Ignis," fire.
पच "Pach," the root of "pachati," is identical with our word "bake;" the
palatal "ch" of the Sanskrit being the equivalent of the Teutonic guttural "k."
When we talk of a "batch" of bread we are literally speaking pure Sanskrit.
नर "Nara" is from the same root as the Greek α-νθρωπος man.

† Another Sanskrit term for fish is *jhash-a*, which seems to connect itself with
the Gaelic and Irish *iasg*. It might seem a hopeless case to connect these with
fish: but the change of the Sanskrit palatals *ch*, *j*, and *jh*, into the labial *f* in
other languages is not uncommon; e.g., Sanskrit, *chatur*, Gothic, *fidvor*, English,
four; Sanskrit, *chaur-a* (a thief), Latin, *fur*, Greek, *φωρ*.

the inflexions both of the classical and Teutonic declensions. The singular cases in the whole are so near as to speak for their own identity; but in the plural there are a few discrepancies which require explanation. It will be seen that the Sanskrit dative and ablative *Pisg-bhyas* are reproduced in the Latin *Pisc-ibus*, whilst the dative of the Greek answers more closely to the Sanskrit locative. The genitive of the Sanskrit, the Latin and Greek uniformly end in *m*. In the Teutonic languages it is the dative which so ends. This confusion is not difficult to account for. The case endings, though numerous, could not express all the nicer shades in the relations of ideas, and came in time to be used with considerable latitude of meaning, as is in fact the case in the Sanskrit writings, and in the application of the inflexions in Greek and Latin. Prepositions are very rarely used in Sanskrit in the government of nouns. In the derivative languages, as the use of the cases became confused, prepositions were more and more necessary to give precision of meaning, and thus, the case endings, in process of time, disappeared, being superseded by the modern system. This abrasion and wearing down can be traced very clearly in the Teutonic tongues. The inflexional system of nouns appears in the Gothic on a par with that of the Greek and Latin. In the Old High German, the Old Saxon, the Old Norse, the inflexions have undergone little change, and are identical, with the exception of dialectic variations, throughout the whole family. In the Anglo-Saxon, and Old Frisian, they begin to appear worn down, and so through the Middle High German and Semi-Saxon, the process is seen going forward until it has reached its consummation in the modern languages, which scarcely retain the shadow of their original case endings. The same process has proceeded in the languages derived from the Latin to even a greater extent, and can only be accounted for by the confusion into which the case endings fell, and the

greater definiteness which is attained by the use of prepositions.

All that it is possible to do in a paper like this is to present a brief illustration on each branch of the subject. I must, therefore, entirely pass over the other Gothic declensions, and their relations to the kindred tongues, and make a brief allusion to the pronouns.

These present strong resemblances throughout the whole Aryan family. The "ah-am" and "tw-am" of the Sanskrit, the $\epsilon\gamma\omega$ and $\sigma\tilde{u}$ of the Greek, the *eg-o* and *tu* of the Latin, the *ik* and *thu* of the Gothic, approximate very closely. To show the connexion between the Gothic and Latin, I will give the inflexions of the pronoun of the third person in both languages :—

G O T H I C .

Singular.

| | <i>Masc.</i> | <i>Fem.</i> | <i>Neut.</i> |
|-------------|--------------|---------------|--------------|
| <i>Nom.</i> | is | si | it-a |
| <i>Gen.</i> | is | iz-os (ir-os) | is |
| <i>Dat.</i> | im-ma | iz-ai (ir-ai) | im-ma |
| <i>Acc.</i> | in-a | i-ja | it-a |

To this, our parent language, the Anglo-Saxon, corresponds, introducing the aspirate in the form of an initial H :—

Singular.

| | <i>Masc.</i> | <i>Fem.</i> | <i>Neut.</i> |
|-------------|--------------|-------------|--------------|
| <i>Nom.</i> | He | Heo or Seo | Hit |
| <i>Gen.</i> | His | Hir-e | His |
| <i>Dat.</i> | Him | Hir-e | Him |
| <i>Acc.</i> | Hin-e | Hi | Hit |

Let us now compare the Latin form :—

Singular.

| | <i>Masc.</i> | <i>Fem.</i> | <i>Neut.</i> |
|-------------|--------------|-------------|--------------|
| <i>Nom.</i> | Is | Ea | Id |
| <i>Gen.</i> | Ejùs | Ejùs | Ejús |
| <i>Dat.</i> | Ei | Ei | Ei |
| <i>Acc.</i> | Eum | Eam | Id |
| <i>Abl.</i> | Eo | Ea | Eo |

Although the Latin does not present the identity which exists between the other two, yet the resemblance is far too great to be fortuitous, and points to a congenital origin.

To shew the connexion between the Gothic and the Sanskrit, I will compare the Gothic demonstrative pronoun or article with the Sanskrit pronoun of the third person :—

G O T H I C .

Singular.

| | <i>Mas.</i> | <i>Fem.</i> | <i>Neut.</i> |
|-------------|-------------|-------------------|--------------|
| <i>Nom.</i> | sa | so | that-a |
| <i>Gen.</i> | this | thiz-os (thir-os) | this |
| <i>Dat.</i> | tham-ma | thiz-ai (thir-ai) | tham-ma |
| <i>Acc.</i> | than-a | tho | that-a |

S A N S K R I T .

Singular.

| | <i>Masc.</i> | <i>Fem.</i> | <i>Neut.</i> |
|-------------|--------------|-------------|--------------|
| <i>Nom.</i> | sa-s | sâ | tat |
| <i>Gen.</i> | tas-ya | tas-yâs | tas-ya |
| <i>Dat.</i> | tasm-ai | tas-yai | tasm-ai |
| <i>Acc.</i> | tam | tâm | tat |
| <i>Abl.</i> | tasm-ât | tas-yâs | tasm-ât |
| <i>Ins.</i> | ten-a | ta-yâ | ten-a |
| <i>Loc.</i> | tasm-in | tas-yâm | tasm-in |

If space had allowed, it would be interesting to show the relation of the other pronominal forms in Gothic, with the Teutonic on the one hand, and the Sanskrit, Latin, and Greek on the other. I must now pass on to the adjective.

Hitherto, we have seen the Teutonic and the classical linguistic forms running side by side and proceeding on the same principles. The adjective gives the first indication of the separation of the Teutonic, and the development of new and self-derived forms. In the Sanskrit and classical languages, the adjectives are declined in each gender according to the paradigm of the substantives.

The Gothic has two separate forms of declension, according

to either of which any adjective may be declined. These are described by grammarians in various terms—the strong and weak, the definite and indefinite, the vowel and consonantal. The distinction runs through the whole Teutonic family, both in the Norse and Deutsch divisions ;* but appears most prominent and complete in the Gothic. The weak or definite form is identical with the weak or consonantal declension of substantives :—

| | GOthic. | | ENGLISH. |
|-------------|------------------|-------------|--------------|
| | God. | | Good. |
| | <i>Singular.</i> | | |
| | <i>Mas.</i> | <i>Fem.</i> | <i>Neut.</i> |
| <i>Nom.</i> | god-a | god-o | god-o |
| <i>Gen.</i> | god-ins | god-ons | god-ins |
| <i>Dat.</i> | god-in | god-on | god-in |
| <i>Acc.</i> | god-an | god-on | god-o |
| <i>Voc.</i> | god-a | god-o | god-o |
| | <i>Plural.</i> | | |
| | <i>Mas.</i> | <i>Fem.</i> | <i>Neut.</i> |
| <i>Nom.</i> | god-ans | god-ons | god-ona |
| <i>Gen.</i> | god-ane | god-ono | god-ane |
| <i>Dat.</i> | god-am | god-om | god-am |
| <i>Acc.</i> | god-ans | god-ons | god-ona |

The strong or indefinite form has its inflexions quite distinct from those of the strong form of substantives. They are as under :—

| | | | |
|-------------|------------------|-------------|--------------|
| | <i>Singular.</i> | | |
| | <i>Mas.</i> | <i>Fem.</i> | <i>Neut.</i> |
| <i>Nom.</i> | god-s | god-a | god-god-ata |
| <i>Gen.</i> | god-is | god-aizos | god-is |
| <i>Dat.</i> | god-amma | god-ai | god-amma |
| <i>Acc.</i> | god-ana | god-a | god-god-ata |
| | <i>Plural.</i> | | |
| | <i>Mas.</i> | <i>Fem.</i> | <i>Neut.</i> |
| <i>Nom.</i> | god-ai | god-os | god-a |
| <i>Gen.</i> | god-aize | god-aizo | god-aize |
| <i>Dat.</i> | god-aim | god-aim | god-aim |
| <i>Acc.</i> | god-ans | god-os | god-a |

* By the Norse, I mean the Icelandic or Old Norse, the Swedish and Danish. By the Deutsch, the High and Low German, Saxon, and the derivative tongues.

In modern English, the whole, and in Swedish and Danish nearly the whole, of these inflexions have been lost. In modern German, the definite and indefinite forms still exist, and will be found to correspond very closely with the old Gothic. The mode in which the different forms were employed is illustrated in the following passage—John, x. 11, “I am the good Shepherd, the good Shepherd giveth his life for the sheep.” Gothic—“Ik im hairdeis gods,” i.e., a good shepherd, expressing the quality generally; “hairdeis sa goda,” i.e., this particular good shepherd; “saivala seinu laggith faur lamba.” The origin of the double inflexions may be thus accounted for. The original Aryan tongue had no article, but was so copious and flexible as not to need any. As the language lost its power, the want was felt of some expressions more definite than the mere substantive inflexions. This was obtained by attaching the pronoun of the third person to the crude form of the adjective. Thus, “godamma” is composed of “god,” the crude form, and “imma,” “to him,” the “i” being changed to “a” by the rule called Guna in Sanskrit, under which “a” is considered the “urvokal” or original vowel, from which the others have been derived, and to which they have a tendency in new combinations to return.

When greater precision was required, the demonstrative pronoun “sa” was employed with the substantive or weak declension. As this grew up into an article, the other declension which had originally expressed definite ideas, drifted into the indefinite meaning, as it now exists in modern German.

It is scarcely conceivable that this process should have taken place in exactly the same manner in several distinct and separate languages. Nothing could prove more clearly the essential identity of the Teutonic family, and its separate existence as a class, than the testimony of this and other similar developments shortly to be alluded to.

I have next to say a few words on the *article*. The history of

the article in the Aryan family of languages is curious and interesting. The Sanskrit has no article. The Greek seldom used the article until after the time of Homer, ὁ, ἡ, τό, being employed in the Homeric poems, chiefly as a demonstrative, or as a substantive pronoun. It came at length to be used in the same general sense as the English "the," and even to be attached to proper names.* The Latin language never possessed an article. The demonstratives *hic, iste, ille*, never became applicable to nouns as a class, or as a matter of course. Their use always implies emphatic demonstration. "In *his* undis maluit jactari, quam in *illa* tranquillitate vivere." — *Cic.* "He preferred to be tossed about in *these* waters than to live in *that* tranquillity." In the Romance languages, derived from the Latin, the breaking up of the Latin construction led to the adoption of the demonstrative "ille," as the so-called definite article, the Italians and Spaniards adopting the first syllable, and the French the last.

We have seen that in the case of the adjective, the same development extends through all the branches of the Teutonic family, giving evidence of its adoption by the mother tongue before its separation into dialects. This is not the case with the article, which is of much later adoption, each language having assumed its own particular form. The Gothic, in this respect, bears a striking analogy to the Latin. Under ordinary circumstances the simple noun is employed, the demonstrative pronoun being added when necessary for the sake of special reference. Thus in the simple sentence—"The earth is the Lord's and the fulness thereof," where our language employs articles to three words without any need of special definition, the Gothic dispenses with the article—"fraujons ist airtha jah fullo izos," answering verbatim,

* The use of ὁ, ἡ, τό, as the article, is later than its use as the pronoun, and sprang from it, as τὸν ἀριστον strictly *him* the bravest, came to mean simply *the* bravest; thus the article defines and strengthens a word.—Liddell and Scott, sub. voc.

to the Latin “*Domini est terra et plenitudo ejus*,” whilst the Greek answers with the same exactness to the English (omitting the verb), “*τοῦ κυρίου ἡ γῆ καὶ τὸ πλήρωμα αὐτῆς*.”

The Gothic employs the demonstrative pronoun as a definite article to identify a subject or word which has been previously referred to—thus, Mat. xxvii. 11, “And Jesus stood before the governor, and the governor asked him saying;” “*ith Jesus stoth faura kindina, jah frah ina sa kindins, qithands*;” the first mention of the subject is without the article, the second introduces it. The same rule applies where attention is called to the same idea under a different word, Mat. ix. 18, “My daughter is even now dead;” “*dauhtar meina nu gasvalt*;” in verse 25, *maid* is used instead of daughter, “and the maid arose,” “*urrais so mavi*,” with the article.

The Sanskrit makes a similar use of the demonstrative pronoun, as in the following passage from the Hitopadésa—“There was a sage named Mahátapas,” **अस्ति महातपा नाम मुनिः** “*asti Mahátapá náma munih*,” without the article—“By the sage a mouse was reared,” **तेन मुनिः श्विकः संवर्द्धितः** “*tena muniná múshikah sanvarddhitah*,” with the article.

In the High German dialect, the demonstrative pronoun, “*der, die, das*,” answering to the Sanskrit and Gothic “*sa*,” became gradually adopted as an article.

The Anglo-Saxon, in the earliest form in which it has come down to us, was devoid of the article, as the following extract from Cædmon will show:—

He ærest gescop
Eorþan bearnum
Heofon to rofe
Halig scyppend !
Tha middan gearð
Moncynnes weard
Ece drihtne
Æfter teode
Forium foldan

He first created
The earth for the children (of men)
The heaven for roof
Holy Creator !
The middle space
The guardian of mankind
The eternal Lord
Afterwards made
For men *the* ground.

In this passage, whilst the English idiom requires the use of the article seven times, and, with one exception, in a general and somewhat indeterminate sense, the corresponding Saxon only employs the pronoun once, and that demonstratively to call special attention to the earth as man's habitation.

In the Anglo-Saxon version of the Gospels the use of the article is somewhat further advanced ; but under ordinary circumstances it is still omitted—thus, in Mat. xi. 5, “The blind receive their sight and the lame walk, the lepers are cleansed and the deaf hear.” Anglo-Saxon, “Blinde geseoth, healte gath, hreofe synd gecloensode, deafe gehyrath.”*

By the twelfth century, the article, originally the demonstrative pronoun, had assumed to a great extent the position which it now occupies, as in the following passage from the *Ormulum*. —

“Uppo the thridde day bilammp †
Swa sum the goddspell cytheth ‡
That i the land o Gallilee
Was an bridall yarkedd
And it was yarkedd in an tun
That was Cana gehaten,” &c.

The peculiarity of the Norse tongues in placing the definite article after the noun seems to indicate a self-development arising probably from the same cause which led in the Gothic to the junction of the personal pronoun with the adjective, as described above. In Icelandic, or Old Norse, *a* ship is “eitt skip,” *the* ship, “skip-it;” the demonstrative emphasis appears stronger in this form than the one adopted by the Deutsch members of the Teutonic family.

I must altogether omit any reference to the numerals, and to the degrees of comparison, in each of which there is a striking parallelism throughout the entire Aryan family. It

* In Wicliffe's New Testament the same principle is still preserved, the passage being rendered thus,—“Blinde men seen, crokide men wandren, mesels bene made clene, deefe men heren.”

† It happened.

‡ Saith.

only now remains to make a few remarks on the Gothic verb, the study of which throws a flood of light on the history and progress of the languages of Europe.

When we compare the English verb in its absence of inflexions, and in its complicated apparatus of auxiliaries, with the wonderful flexibility and self-contained power of the Greek, or even with the much more circumscribed range of the Latin verb, it is difficult to believe that they are at all related, or can possibly have sprung from the same parent stock; yet it is a fact capable of the most satisfactory proof that such must have been the case. If we trace back the Teutonic verb to its earliest specimens, we find a constantly increasing resemblance to the classical forms, until, at length, in the Gothic language, we discover the point of departure where the two streams, heretofore parallel, have finally diverged. The language at this stage presents the appearance of having been worn down and abraded, so to speak; and to have lost much of its expressive power. In starting afresh in the career of civilisation to regain what was lost, it seems to have opened out a new course developed from within, supplying itself with fresh forms as they were required. These forms continue to the present day in common use in our own and every other branch of the Teutonic family.

The inflexions of the Gothic verbs are simple, and the inflected tenses few, consisting only of the present and past in the indicative and conjunctive moods.

If we compare the present tense of the Gothic with that of the Latin, we shall find a very striking similarity, if not absolute identity, the Gothic possessing a dual number which is wanting in the Latin:—

Gothic, Haba. *Latin*, Habeo. *English*, To have.

| | GOTHIC. | LATIN. |
|--------------|-----------|--------|
| <i>Sing.</i> | 1 haba | habeo |
| | 2 habais | habes |
| | 3 habaith | habet |

| | | |
|--------------|-----------|----------|
| <i>Dual.</i> | 1 habos | |
| | 2 habats | |
| <i>Plu.</i> | 1 habam | habem-us |
| | 2 habaith | habet-is |
| | 3 haband | habent |

The inflexions of the present conjunctive indicate a similar connexion.

If now we examine the past tense, we find in the Gothic alone, of all the Teutonic family, the remains of a past tense formed by reduplication, as “greta,” I weep; “gaigrot,” I wept; “falda,” I fold; “faifold,” I folded. The Sanskrit second preterite and the Greek perfect tenses are formed in like manner. Sanskrit, “bodhāmi,” I know; “bubodha,” I knew; “tanomi,” I stretch; “tatāni,” I stretched. Greek, “λυω,” I loosen; “λελυκα,” I loosed; “τυπτω,” I strike; “τέτυφα,” I struck. The Latin has the remains of a similar formation in such verbs as “mordeo,” I bite; “momordi,” I bit; “tego,” I cover; “tetigi,” I covered. This, in fact, seems to have been the original formation of the past tense in the Aryan tongue.

The number of reduplicated preterites in Gothic is small. The generality of verbs expressing simple ideas form their preterites by a change of the radical vowel, as “rinna,” I run; “rann,” I ran; “liga,” I lie; “lag,” I lay. This is identical with what is called the strong form of conjugation in the whole of the Teutonic languages. In Latin also this change, or a consonantal one, forms a large part of the perfect tenses, as “moneo, monui,” “rego, rexi.” The strong form in the Teutonic tongues belongs to the verbs expressing the simplest ideas, and in the Gothic, they are principally intransitive. As expression became required for more extended ideas, secondary verbs were formed of a derivative character. The manner in which this was done is curious and instructive, and has exercised a very important influence on our own language to the present day. The secondary verbs were formed from

substantives or adjectives by adding the termination “jan,” and from the strong verbs by adding the same termination to the preterite—thus, from “stain,” stone, was formed “stainjan,” to stone; from “varm,” warm, “varmjan,” to warm; from “ligan,” to lie; “lagjan,” to lay; from “reisan,” to rise; “raisjan,” to raise. The connexion between such English verbs as “to sit,” and “to set,” “to rise,” and “to raise,” “to lie,” and “to lay,” is here satisfactorily explained, and nowhere else. The secondary verbs thus formed were incapable of a preterite arising from vowel change. The difficulty was met by superadding, as an auxiliary, the past tense of the strong verb “didan,” to do:—

| | | | | | |
|--------------|-------|-------------|--------|-------------|--------|
| <i>Sing.</i> | dad | <i>Dual</i> | dedu | <i>Plu.</i> | dedum |
| | dadst | | deduts | | deduth |
| | dad | | | | dedun* |

“Lagi-dad, thus expressed—“lay I did,” or “lay-did,” contracted in English to “laid.” In High German, the “d” is exchanged for “t,” thus, “legetat” becomes contracted to “leget,” or “legt.” This mode of forming the preterites of the weak verbs prevails through the whole of the Teutonic tongues, both Norse and Deutsch, giving a strong indication that the Gothic lies very near the common original of these various dialects. We have preserved in English more fully than in any other language this form of the preterite. When we say “I loved,” or “did love,” the expressions are identical, the first being merely a contraction of “I love-did.”†

A few words on the future tense, and I have done.

The modern languages of Europe were all in their early stages destitute of any tense expressing simple future time apart from the idea of obligation or volition. This want was

* The preterite in the derivative verbs is thus formed:—

| | | | | | |
|--------------|--------------------|-------------|---------------|-------------|---------------|
| <i>Sing.</i> | 1 lagi—da(d) | <i>Dual</i> | 1 lagi—dedu | <i>Plu.</i> | 1 lagi—dedum |
| | 2 lagi—des (dadst) | | 2 lagi—deduts | | 2 lagi—deduth |
| | 3 lagi—da(d) | | | | 3 lagi—dedun |

† See Gabelentz, “Grammatik der Gothischen Sprache,” pp. 28-96.” Grimm, “Deutsche Grammatik,” 1-1040. Max Müller, Lectures p. 89.

not supplied until after the separation of the parent Teutonic stock into dialects and languages. Each, therefore, formed its future tense in its own way. Want of space prevents me here entering upon the subject. Sir Edmund Head has written a very amusing and instructive essay on the future auxiliary verbs, to which I would refer my readers.* The Gothic expresses the future sometimes by the present tense, sometimes by a circumlocution, sometimes by an auxiliary.

It is commonly thought that only the modern European languages exhibit this defect in their early stages ; but deeper research seems to show that the same difficulty has always existed, and that the idea of the simple unconditional future is by no means readily apprehended by the human mind. To say nothing of the Hebrew, in which difficulties exist in the future tense which I am quite incompetent to deal with, I will refer in very few words to the Sanskrit and Latin.

The Sanskrit first future is formed by a combination of the noun of agency with the substantive verb. Thus, from "raj," to govern, is formed the first future "rajayitasmī," which literally means "I am a governor," though used to express "I shall govern." So in the Latin, "reg-am," I shall rule, is a similar expression abbreviated. Both give the root "raj" or "reg," with the substantive verb "as," or "asm-i," equivalent to the Saxon "eom," or the English "am." "Reg-am," then, signifies "I am a ruler," or "I am to rule." It may be objected to this that the Latin future is only thus formed in two conjugations, and that "Amabo" and "Monebo" cannot be thus accounted for. Singularly enough in this case the exception proves the rule. There are in Sanskrit two substantive verbs, "as" or "asm-i," answering to our "am;" and "bhu," equivalent to the Saxon "beo," and the English "be."

* "Shall and Will, or Two Chapters on Future Auxiliary Verbs." London: Murray, 1856.

With the latter of these the future of the two first Latin conjugations is formed ; “ audi-am ” is literally “ I am to hear ; ” “ mone-bo,” “ I be to admonish.” The difficulties in expressing the future are thus found not to be new, but to have existed from the earliest times.

The Gothic is the only Teutonic language which has preserved the dual number. In the kindred tongues some faint traces are found of the dual number in the pronouns ; but in the verbs it has been utterly lost. The Gothic dual of the verbal conjugations, though not so complete as in the Sanskrit, is nearly as much so as in the Greek. Its use is somewhat peculiar. In narrative the plural is employed even when two only are spoken of ; but in discourse and conversation the dual is always used. This peculiarity will be seen in the following passage—Mark 11, v. 2 :—

“ *Jesus insandida tvans siponje, jah qath du im* (pl.)

“ Jesus sent two disciples, and said to them,
gaggats (du.) *in haim, jah bigitats* (du.) *fulan* ;
 go into the village, and ye-shall-find a foal ;
andbindandans (du.) *ina attiuhits*, (du.) *jah jabai was*
 unloosing him, bring, and if any one
iggqis (du.) *qithai duwe thata taujats* (du.) *qithaits* (du.)
 to you saith why that do ye ? say
thatei frauja this gairneith. Galithun (pl.) *than jah*
 that the-Lord this needeth. They-went then and
bigetun (pl.) *fulan*.
 found the foal.

The Gothic is also the only Teutonic language which possesses a true passive voice. Its forms are few and simple, extending only to the present tense of the indicative and conjunctive moods. It is, nevertheless, much used even in cases where the Greek is expressed actively, *e.g.*, Luke c. 6, v. 38 —“ Good measure shall they give unto you.” Greek—“ *μετρον καλον δωσουσι.*” Gothic—“ *mitads goda gibada,*”—“ good measure is (shall be) given.”

The passive voice is conjugated as under :—

FIRST CONJUGATION.

Haitan. *Ger.* Heissen. *Anglo Sæx.* Hatan.

Old Eng. Hight, to be called.

INDICATIVE.

CONJUNCTIVE.

PRESENT TENSE.

Singular.

| | |
|-----------|-----------|
| 1 haitada | haitaidau |
| 2 haitaza | haitaizau |
| 3 haitada | haitaidau |

Dual wanting.

Plural.

| | |
|------------|------------|
| 1 haitanda | haitaindau |
| 2 haitanda | haitaindau |
| 3 haitanda | haitaindau |

The reflective form is also used to a considerable extent in the expression both of passive and intransitive verbs in the Greek, thus, “to be hidden,” “gafilhan sik ;” “to appear,” “ataugjan sik ;” “to be separated,” “afskaidan sik ;” “to repent,” “idreigon sik.”

The above slight and rapid sketch may give a general view of the grammatical forms of the Gothic language, and of the relations in which they stand both to what may be called the affiliated tongues of the Teutonic stock on the one hand, and to the Sanskrit and classical languages on the other.

In my next paper I propose to treat on the substance or vocabulary of the language.

NINTH ORDINARY MEETING.

ROYAL INSTITUTION, January 24th, 1862.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

The Right Rev. H. N. STALEY, Bishop of Honolulu, was elected an honorary member.

Messrs. HARRY A. EWER, J. W. FLAMANK, and JOSEPH SNAPE were elected ordinary members.

Capt. JAMES PETRIE, Commodore of the Inman line of American Packets, was recommended by the Council for election as an Associate.

The PRESIDENT made the following communication:—In the months of September and October last, I received several communications from Mr. Wm. Harrison, whose practical acquaintance with the botany of the district is manifested by his many contributions to the Liverpool Flora. The following is a summary of his observations:—

“On a gravel walk in a garden, at Walton, I frequently at night remarked the appearance of luminous particles, moving in various directions, and so numerous and bright as to remind me of the stars in the sky. It was soon apparent that the lights were produced by a very small worm, which varies from a quarter to three-quarters of an inch in length; being nothing more, so far as I could discern, than the young of the common earth worm. It was not the worm itself that was luminous, but something which appeared to exude from various parts of its body. On lifting up some of the worms with a pin, portions of the luminous matter occasionally fell to the ground, and broke into smaller pieces. Each light

lasted about ten minutes. It was very interesting to observe the shining globules apparently running about the walk. On throwing the light of a lamp on any one of these moving pieces, I found that it was being conveyed away by a beetle, several species of which were thus engaged, and every one fought hard before it would allow me to rob it of its load. The thought struck me that the worms required to be wounded before they emitted light; accordingly, by the aid of a lamp, I found seven worms that were not luminous; and taking them one by one, I pricked them with a pin; the result was that each of them shone beautifully. The beetles then were feeding on the worms, and every one they attacked produced light. The specimens I took continued to give out light after they were immersed in spirits. The gravel on the walk had been the ballast of a ship; but other walks made of the same material did not afford a single light. So numerous were the gleaming particles on one occasion, that they stuck to the feet of a dog, and, as he trotted along before me, his feet presented a most curious and interesting appearance. The president of the Entomological Society informs me that the luminous appearance is caused by *Scolopendra phosphorescens*—*Geophilus electricus*; that the phenomenon has been noticed in other parts of the kingdom, where the beetles engaged in a like transaction have been identified as *Steropus modidus*, *Goverius olens*, and *Nebria brevicollis*."

To these remarks of Mr. Harrison, I have only to add, that *Geophilus electricus* is well known to be luminous; but that the specimens sent to me as having emitted light at Walton were not *centipedes* of any species, but worms closely resembling a small species of *Lumbricus*. *Geophilus subterraneus* is common in the district: I have seen it attack small worms with ferocity: the species of the genus are all extremely agile, most unlikely to allow themselves to be wounded by

Mr. W. NISBET exhibited the humerus of a whale, which had been dug out of the clay under the submarine forest near Leasowe Castle. The diameter of the round head and the length of the bone showed it to belong to a very large species, and one consequently rare in British waters. It has a semi-fossilized appearance, from the blue clay pervading the very centre of the bone, thus indicating an ancient date for its submergence.

Mr. MOORE mentioned that several spinal bones of a small species of whale had been found in digging out the Liverpool docks ; and a human skull and other bones had been taken out of the blue clay in the bed of the Birket, on Wallasey Pool, about twenty feet under the surface.

The following paper was then read :—

ON A SO-CALLED THEORY OF CAUSATION :

(*Vide* "System of Logic," by J. S. MILL, Esq. ; book iii, c. v.)

BY THE REV. T. P. KIRKMAN, M.A., F.R.S.,

Honorary Member of the Literary and Philosophical Societies of Liverpool and Manchester.

WHEN I ask why, in my waking moments, does my finger move, the partial answer with which I am satisfied, as far as it goes, is this—because I have the power and the will to move it. I think I am as conscious of the power as I am of the will. I think I am right in affirming that the power and the will to move it are two distinct facts, or elements, of my consciousness, of which neither the one nor the other can be obtained merely from experience, any more than my notion of my own identity or responsibility ; and for this opinion, which is not hastily formed, I am prepared to adduce what appear to me to be clear and sufficient reasons, if it should be worth the while of any one to raise the question.

David Hume, in his chapter *On the Idea of Necessary Connexion*, would persuade me that I have indeed a consciousness of the *will* to move my finger ; but that I am using a word without a corresponding conception or meaning, when I say I am conscious of a *power* to move it, if I intend to assert as my *power* anything further than an *expectation* that my finger will move at my volition, which expectation is founded merely and entirely on my experience that it has formerly moved at my volition. His doctrine is, that such words as *power* and *force* in philosophy are utterly without any corresponding idea or reality, distinct from the relation of invariable *antecedence and sequence* ; and hence, that there is nothing complete idea of causation beyond this relation of

invariable sequence, or rather of sequence invariable in our experience.

I suppose there are minds to which there is a certain charm in the sceptical simplicity of such notions ; but I have never had the fortune to see them supported by anything more than bold assertions and feeble evasions, in pages loaded with what seem to me propositions both puerile and false. The drift of such doctrines—so far as I have light to make it out—I say the *drift*, not the *conscious aim*, of any given writer, is to show that the sentiments of gratitude, wonder and worship, which form to me, both as a man of science and as a believer, the best part of my contemplations of life and nature, are utterly unphilosophical, and as much out of place in such contemplations as in the study of the first tables of arithmetic.

I think I can see, that whenever science, among men or angels, shall have advanced far enough to demonstrate the necessity of any force or fact of nature, as the truths of geometry are demonstrated, the hypothesis of an Author or a Preserver of the universe will be unphilosophical, and the sentiments of religious adoration will be banished from the entire world of finite fact, of real existence, of personality, into the sphere of the purely and absolutely *ideal*. Far be it from me to say that such a sphere of the ideal is a sphere of nothing at all, or that religious truth and sentiment have not there a worthy dwelling place and glory. So far as I know myself, I am perfectly willing to adopt any sceptical scientific doctrines, on one condition—that of compulsion—compulsion by demonstration, irresistible as that of geometry ; for I apprehend no loss to my soul's capacities or necessities from any change of my merely intellectual habits, due to the influence of sound logic.

The first thing to be done to make way for these doctrines, is to clear our philosophy of all craving after *efficient causes*, which really produce the effect, and to root out of our notion

of causation every conception of power or force or compulsion, distinct from the mere relation of invariable antecedence and sequence—as completely as the conceptions of necessity and will are excluded from the multiplication table.

Until, however, I have felt the force of such compulsion I have mentioned, at least on some one topic, I do not think that I ought to be ashamed of confessing that, thus I heartily dislike the tone of this sceptical philosophy, and whatever I may think of its guesses and assumptions, I disallow all that I have yet seen of its *demonstration*, as an empty ambitious sham. The object of this paper is to inquire how far Mr. Mill is able, in what he is pleased to call his *Treatise of Causation*, to bring this compulsion to bear on me.

I may premise, to prevent any possible misconception I never had the pleasure of seeing the author named, and I know nothing more of him than what I read in the title-page of his *System of Logic*. False logic, in a book which gives itself such a title, particularly on such a subject as causation, can expect no quarter from any one. And in the injurious tone which Mr. Mill has assumed, in those passages of this fifth chapter of his third book, towards those philosophers who refer the universe of life and nature to Power and Will, either mediately or immediately, as efficient cause, inclines me little to make allowances, if logic turns out to be less than what it pretends to be, rigorous demonstration. It is, I believe, one of the most marked differences between us Englishmen and most other nations, that debate and discussion can go on to almost any extent among us, without generating either the feeling or the suspicion of personal disrespect.

Mr. Mill observes in the fourth edition of his *System of Logic*, book iii, chap. v, §1, that “in the laws of number, and in those of space, we recognise, in the most unqualified manner, the rigorous universality of which we are in quest.”

He there says "that they have been in all ages the type of certainty;" "that their invariability is so perfect that it renders us unable even to conceive any exception to them." To these propositions every thinker will assent.

He remarks in the next page that "it is not enough for us that the laws of space and those of number possess the rigorous certainty and universality of which we are in search:" a position which no man will gainsay, who has the misfortune to be, like Mr. Mill, in search of definite scientific truths of the same rigour out of the domain of number and space. And he thus states the problem to be solved—"We must endeavour to find some law of succession which has those same attributes," namely rigorous certainty and universality, mentioned in the preceding sentence. He further states thus the conditions of the problem—"This fundamental law must resemble the truths of geometry in their most remarkable peculiarity, that of never being, in any instance whatever, defeated or suspended by any change of circumstances."

Here is a clear question asked. We see around us in this world successions of phenomena; we agree that there is both succession and order of succession, and we are perpetually urged to ask the reason why. We should be unspeakably thankful to a teacher who should enable us, as Mr. Mill says, to get a fundamental law, whereby a clear question about the why and wherefore of this succession shall be clearly answered, as questions are answered in the sciences of number and space. It is long exceedingly to learn some fundamental truths concerning this order of succession, such that we may go away, go away from the study of geometry, unable, as Mr. Mill says, even to conceive any exception to them.

This great problem is luminously stated; and we are so fortunate as to have among us one capable of developing a law of causation. We are excited by the very title, and eagerly to gather the wealth of instruction.

You shall not wait long—thus speaks the teacher in the words next following—“Now, among all those uniformities of succession which common observation is sufficient to bring to light, there are very few which have any, even apparent pretensions to this rigorous indefeasibility, and of these few, only one has been capable of completely sustaining it. In that one, however, we recognise a law which is universal also in another sense—it is co-extensive with the entire field of successive phenomena—all instances whatever of succession being examples of it. This is the law of causation. The truth that everything which has a beginning has a cause is co-extensive with human experience.”

There is a climax and a culmination for you ! Observe the additional and crowning glory of this theorem. This truth, besides being fit to take rank with those of the sciences of number and space, in certainty, in universality, in rigorous indefeasibility, this truth is co-extensive with human experience ! I am not examining here either the meaning or the correctness of the utterance that everything which has a beginning has a cause ; but only its peculiar claim to high position in philosophy. This is the point to be here established ; *the other sense*, the *special* sense, in which this truth is *universal*. It is co-extensive with human experience ! I hardly know how to express my disappointment. Who ever thought of measuring the truths of geometry, and of ticketing that measure as an additional dignity, with the tape of human experience ? We are left to compensate, as we can, the marvellous simplicity of the discovery that everything which has a beginning has a cause, by the droll character of its crowning claim to scientific honour.

The author anticipates our disappointment, and thus proceeds—“This generalisation may appear to some minds not to amount to much, since, after all, it asserts only this—‘it is a law that everything depends on some law,’ ‘it is a law that

there is a law for everything.' We must not, however, conclude that the generality of the principle is merely verbal ; it will be found on inspection to be no vague or unmeaning assertion ; but a most important and really fundamental truth."

Well, we take heart at these fair and positive promises, and draw near for the inspection. There may be something for us to learn from a rigorous and universal theorem in which the vast subject is *every fact that has a beginning*, and in which the predicate contains the word *cause*. For we all remember, with what wonder we have often gazed on the successions of nature around us, and tried in vain to search into that deep and awful thing—the *cause*.

The author goes on, and very properly sets himself first about defining his terms. I will not stay to lament that he did not, according to the usual course in works of science, favor us with his definition before the enunciation of his theorem ; for, if he had done this, I really cannot conceive how the theorem could ever have been delivered at all. He gives his definitions thus—"When I speak of the cause of a phenomenon, I do not mean a cause which is not itself a phenomenon. The causes with which I trouble myself are not *efficient* causes, but *physical causes*. They are causes in that sense alone, in which one physical fact is said to be the cause of another. Of the efficient causes of phenomena, or whether any such causes exist at all, I am not called upon to give an opinion."

He takes especial care to tell us that he does not belong to "the schools of metaphysics most in vogue at the present moment," in which "is deduced a supposed necessity of ascending higher," "to find the true cause, the cause which is not only followed by, but actually *produces*, the effect." The italics are his. The word *produces* evidently amuses him as much as the term efficient cause. I do not pretend to give all that he says, nor is it worth while ; for his phrases appear

to me to represent nothing accurately of the notions of living men of science, except his own dissent from the common sense and conscience of nineteen out of twenty of them : and I half suspect that he himself is one of the nineteen.

One excellent thing he endeavours to do—to give us a definition of his notion of a cause. His words are—"The only notion of a cause which the theory of induction requires, is such a notion as can be gained by experience." This is, perhaps, clear so far ; but one cannot help wishing it were not quite so far. Every one, who can give an account of his experience, can give an account of this "notion of a cause." It is something that can be seen, or heard, or smelt, or tasted, or remembered as a result of digestion, bodily or mental. That, and nothing else, is a physical cause ; all the rest is metaphysics or moonshine, or both.

The great theorem, which is to take rank as a fundamental truth with the demonstrations of number and geometry, is this—every fact which has a beginning has a cause ; and this cause is itself a phenomenon, a physical fact, a result of experience. The grand discovery turns out to be simply this—that every fact A which has a beginning, comes invariably after some other physical fact B, which is *affirmed* to be the cause of the fact A ; and the pith of the discovery lies in the law thus solemnly advanced, with a cool substitution of *causation*, of which he is not, for *succession*, of which he is, talking. "The law of causation, the recognition of which is the main pillar of inductive science, is but the familiar truth, that invariability of succession is found by observation to obtain between every fact in nature, and some other fact which has preceded it." So it comes out, at last, that we are not about to learn anything about causes, properly speaking, at all. It is the old jest of *Hamlet* with an omission, by particular request : and truly everybody knows, in spite of the magnificent title of this chapter, *On the Law of*

Universal Causation, and in spite of his very amusing persuasion that he has set forth (§ 9) a Theory of Causation, that Mr. Mill is no more competent to write that chapter of science, in any proper sense of the term, than the archangel Gabriel is. We are now at the bottom of it. You were not satisfied with the absolute certainty and universality of your theorems in number and space, and you have at last discovered a truth, a main pillar of inductive science, which is to take rank with the best of them. This great thing is, *a familiar truth, found by observation*.

What is your geometry to that? Assuredly no geometer ever came forward with a familiar truth of observation; even in his axioms he gives you more than that; if he refers you to observation, he will defy you to conceive the contrary, or to ask a clear question which is not clearly answered: and the oddest part of all this is, that the *observation*, which discovers this familiar yet rigorous and fundamental law, is the same faculty of which we have been informed before, that it is not sufficient to bring to light a single truth besides, about succession, which is rigorous and indefeasible.

There is a wonderful resemblance between this main pillar of science, so far as it has as yet been exhibited, and another familiar truth, which I suppose will hold the same rank in the sciences of position that the fundamental theorem before us holds in those of succession, namely, this, that every point in space is invariably next neighbour on the right to some other.

Let it be granted that this invariable succession of a fact A after a fact B really holds good throughout nature, and let more be granted than the author has explicitly postulated—for he has left it only to be inferred, and has not manfully laid down his conviction—that there never was a first physical fact, such as we conceive or believe creation to be. But let it be granted that there never was a first fact: will the author's theorem even be fit to take rank with those of geometry?

Compare it with the theorem, that if two sides of a triangle are equal, they are opposed to equal angles. The geometer both proves the equality of the angles, and defies you even to conceive it otherwise ; he defies you to invent any *proviso*, or any *if*, which can possibly be introduced. But in what Mr. Mill has to say about his discovery, I can find neither the proof nor the defiance that I see stamped on the truths of geometry. I ask for clearness and universality, and what do I get? First, I get a sentence already quoted about the insufficiency of common observation to bring great truths to light. Afterwards I get (§ 2), "Between the phenomena then which exist at any instant, there is an invariable order of succession;" "to certain facts certain facts always do, and, as we believe, always will, continue to succeed." "The invariable antecedent is termed the cause: the invariable consequent, the effect." And in § 6, "But granting that an effect may commence simultaneously with its cause, the view I have taken of causation is no way practically affected. Whether the effect coincides in point of time with, or immediately follows the hindmost of its conditions, is immaterial."

That is what you call good defining. You have it plain before you. Take sure aim, and hit that shadow if you can !

We began with a certain fact A, which has for its invariable antecedent a certain fact B. We find ourselves, in a moment, by a sort of dissolving view, in presence of an assemblage of antecedent phenomena B, of which the number may be indefinitely great, or, for anything that appears to the contrary, infinite. Then we are suddenly able to give up altogether the notion of succession, and it makes no difference, whether the effect coincides or not, in point of time, with its cause. So much for clearness, certainty, universality.

And where is the defiance always offered by geometry, the defiance even to conceive the contrary? Is it impossible for you to conceive that a fact A, which Mr. Mill may name,

should not follow a certain phenomenon B? Suppose that A has always followed B in human experience, is it really impossible to imagine, is there always a flat contradiction in the conception, that A might not follow B, if a force or a will capable of preventing it were exerted?

There are two things which Mr. Mill has to undertake, both far beyond his powers: the first is to answer a challenge, the second is to reply to a retort.

The challenge is this—If your theorem is worth anything in science, if it can be handled as an instrument of thought, you ought to be able to favor us with some exact application; you can produce at least some one effect A, and clearly pick out and exhibit its phenomenal cause B, defining B precisely in compass and number, in time and place, and in its peculiar relations to A. This challenge he appears to decline, and in all that he has written about and about it, I can see no indication of a capacity to meet it. In § 6, he says—“As to the ulterior question, whether it is strictly necessary that the cause, or the assemblage of conditions, should precede, by ever so short an instant, the production of the effect (a question raised and argued with much ingenuity by a writer from whom I have quoted, the reviewer of Dr. Whewell in the *Quarterly Review*), the enquiry is of no consequence for our present purpose.” I have not read the article in the review referred to; but I can easily imagine, that the author has given an account of this theory of causation, which Mr. Mill would gladly have forgotten.

Before I proceed to the retort of Dr. Reid, I may observe that Mr. Mill has again and again fairly given up all claim of his theorem to the certainty and universality which he at first assured us were its attributes. He comes down most amusingly in his way of stating the matter. In one place he says, § 2—“To certain facts, certain facts always do, and as we believe, will continue to, succeed.” *As we believe!*

Is this the phrase of the geometers? In another place he observes, § 5—"It is necessary to our using the word cause, that we should believe, not only that the antecedent always has been followed by the consequent, but that as long as the present constitution of things endures, it always will be so." As long as the present constitution of things endures! Is that the style of the geometers? In a third place he remarks, § 7—"The state of the whole universe, at any instant, we believe to be the consequence of its state at the previous instant; inasmuch that one who knew all the agents which exist at the present moment, their collocation in space, and all their properties, in other words, the laws of their agency, could predict the whole subsequent history of the universe, at least, unless some new volition of a power capable of controlling the universe should supervene." All this is in a strain far different from that of geometry, which treats of certainties unchangeable even by a power that can control the universe.

It is evident, that the conscience and common sense of the author are too strong even for his ambition to imitate the exploits of David Hume, and to do what no man, perhaps, has done for the last three thousand years, to discover and establish a clear and serviceable theorem in metaphysics or quasi-metaphysics, as distinct from physical science and the simple truths of morals and religion. In handling the word cause, he has, like other people, a clear notion of a cause proper, an efficient cause. He has in his mind the one great efficient Cause; and, like ordinary men, he is no thinker, but what is far better, a believer and a worshipper in the presence of that Cause.

We come now to the neat retort of Dr. Reid. It was a playful, but a fatal, blow to the sophistries of Hume; and it is painful to see the agony of Mr. Mill in his effort to make light of it. He twists and writhes in a manner fearful to behold, and, finally, he hangs himself in dark despair in the coils of his own logic.

In the dreary waste of metaphysics, and in that border region of the higher logic in which Mr. Mill is doomed to walk, there have been so few good things, since the world began, ever clearly said, that one goes a long, long way. Not many of us will live to hear anything so well said as this famous retort of Dr. Reid. Let us see how Mr. Mill deals with it. In § 5, he observes—"When we define the cause of anything to be 'the antecedent which it invariably follows,' we do not use this phrase as exactly synonymous with 'the antecedent which it has invariably followed in our past experience.' Such a mode of conceiving causation would be liable to the objection very plausibly urged by Dr. Reid, namely, that according to this doctrine, night must be the cause of day, and day the cause of night." "But it is necessary to our using the word cause, that we should believe not only that the antecedent always has been followed by the consequent, but that, as long as the present condition of things endures, it always will be so." "If there be anything which confessedly belongs to the term necessity, it is *unconditionalness*. That which is necessary, that which must be, means that which will be, whatever supposition we may make in regard of all other things. The succession of day and night is evidently not necessary in this sense." Again—"There are sequences as uniform in past experience as any others whatever, which yet we do not regard as cases of causation, but as conjunctions in some sort accidental. Such, to an accurate thinker, is day and night." I hope that this may be all convincing to somebody; to me it sounds rather like the groans of logic in sore tribulation.

I hasten to the *coup de grâce* which the author deals to himself with his own right hand. Here comes the final definition (p. 372), fourteen pages after the enunciation of the great theorem, which, in common books of science, it would have preceded. § 5—"We may define, therefore, the cause

of a phenomenon to be the antecedent, or the concurrence of antecedents, on which it is invariably and unconditionally consequent." But stop, it is not quite final ; the next words are—" Or if we adopt the convenient modification of the meaning of the word cause, which confines it to the assemblage of positive conditions, without the negative, then, instead of 'unconditionally,' we may say, 'subject to no other than negative conditions.' "

One is thankful to have the author's help to be rid of that difficult negative word "unconditionally;" whatever comes in its stead can hardly be more indefinite or puzzling to ordinary heads. So we will make the queer substitution which he is good enough to supply, and which, in a fundamental definition of a great theory, most discoverers would have formally made. And now the final definition reads exactly thus—" We may define, therefore, the cause of a phenomenon to be the antecedent, or concurrence of antecedents, on which it is consequent invariably, and subject to no other than negative conditions." I hope you are enlightened now: the author has taken prodigious pains to model and mend his definition for you, and he is not bound to find you in philosophical profundity: you feel obliged to him, and a little ashamed of your own dulness; and you modestly confess that, besides the puzzle arising from the addition in a scientific definition of a phrase comprising conditions written next after the word invariably, you are really at a loss to know, first, what is exactly meant by the subjection of a thing invariable to none other than negative conditions; and, secondly, what this invariable thing is, because a choice is offered you in the definition with embarrassing liberality. You may choose either an antecedent, or you may choose a concurrence of antecedents for the invariable, and if you choose the latter, you feel a little puzzled to discover, whether the secret of causation lies in the mere antecedence, or in the process,

operation, or combination, or force, denoted by the figure of speech "concurrence of antecedents:" for, when you consider that there are millions of millions of antecedents to every phenomenon A, all alike phenomena, all equi-distant in order of time from the phenomenon A, and all, for anything we know, contributing to the phenomenon A, as well as to its contemporaneous phenomena, you hope the learned author of the definition will not laugh at you much, if you are a little bewildered in trying to ascertain what you have learned about the cause of the fact A.

Well, fortunately, whatever becomes of your second difficulty, I can help you in the first; for the author has made that in part pretty plain, at page 366, § 3. His words there are—"The negative conditions of any phenomenon, a special enumeration of which would generally be rather prolix, may be all summed up under one head, namely, the absence of preventing or counteracting causes."

Nothing can be more deliberate, nothing more precise. All that we have to do, after working through these fourteen pages, is to make the substitution exactly supplied by the author for *negative conditions*. Once more, then, the final definition reads thus—"We may define, therefore, the cause of a phenomenon to be the antecedent, or concurrence of antecedents, on which it is consequent invariably, and subject only to the absence of preventing or counteracting causes."

Jamque opus exegi, quod nec Jovis ira, nec ignes,
Nec poterit ferrum, nec edax abolere vetustas!

Here is indeed a triumph of logic. It turns out that the last word, perhaps the most emphatic word, in the definition of a *cause*, is the word *causes*! All these treasures of philosophy are our own, if, after laboriously learning the definition of a cause, we can find one little key, to unlock the meaning of the word causes. *Plaudite, plaudite*! Never before was such a feat of dialectics achieved or attempted by mortal man!

There is but one thing in the world worthy to be compared with this impossible achievement of logic ; and that one is among the most charming phenomena in Nature. It is a pussy-cat on the hearth-rug in full chase after her own tail. Pussy and Mr. Mill are two courageous philosophers. As she has a soul above "the sheep of little Bo-Peep, who carried their tails behind them," so he has a soul above those ordinary thinkers, who are content not to search the unsearchable. Both fix their eyes steadily on the subject : both are aware that the proper way to take hold of a subject is to seize it by the end. At that end each makes many a splendid plunge ; but, somehow, the result is, that each performs, for my private amusement, a series of wonderful gyrations.

There is something to be envied in the ease with which metaphysicians and quasi-metaphysicians, with a jaunty flourish of a pen, can build you a theory in half a dozen lines. In other departments of science, a theory represents a considerable amount of work done before it can be presented to the world ; but it is far otherwise in the line of Mr. Mill. Are you ambitious of philosophical renown ? Take some leading term of science and disembowel it. With the word, reduced to a shadow of its meaning, indite some familiar observation upon all things through all time and space ; and to prevent anybody calling it a truism, take care that it is not quite true : then inform your neighbours, that you have built up a main pillar of science. If there is a crack in your pillar, you can mend it with a ragged definition of terms which you forgot to define before. Next patch and cobble your definition, till it is very like a whale ; and then, without any further argument, illustration, or application, write over your work, *The Theory of Somethingdeepation, set forth by me.*

There is a strange defect in the notion which Mr. Mill, like Hume, affects to have, of what the word *cause* suggests to the merely physical philosopher. According to him, a cause, in

philosophy, can mean only two things, either a phenomenon, or a mysterious nonentity of metaphysics. He notices only one distinction, that between efficient causes and physical causes. For efficient causes he appears to have small respect; he will talk of nothing, and know nothing but of physical causes; and by the latter he expressly declares that he means *phenomena*. Phenomena and physical causes are to him precisely the same thing. All the rest is mere metaphysics. According to him the physicist needs take into account no causes which are not phenomena. This is his doctrine, if words have any meaning.

But is there anything more contrary to fact? Take up Newton or Laplace. These are not metaphysicians; but they are perpetually talking about physical causes which are not phenomena. They talk about *forces*. They are always demanding an answer to the question, what is the cause? and they are content if they can definitely indicate forces. Not that they pretend to have a perfect idea of the forces. They say, as Newton said, *conceptus est mathematicus*. The symbol they use for the force is always algebraical or numerical—it is number so and so. This serves their turn—this enables them to calculate, to combine, and to predict. But those forces, though they are more than the mere symbols which represent them in the formulæ, are certainly not phenomena. The *vis impressa*, the *vis inertiae*, the *vis centripeta* of Newton—all the cosmic, mechanical, chemical, vital forces, that figure, or that will, as philosophy advances, figure in unambiguous symbols in the formulæ of rigorous science—all these are physical causes which produce phenomena for their effects, but which are themselves not phenomena. Why does a stone fall to the ground? An answer sufficient for the purpose of science is, not as Mr. Mill would pretend, because a phenomenon has preceded, but because *a force acts*; the force which is registered by a certain decimal fraction in our formulæ;

but where is the man to whom this force was ever a phenomenon, except indirectly by the phenomena which are its effects? Does, then, our symbol g stand for nothing besides a number and a metaphysical non-entity? Surely there was never anything more peurile than the pretence, that we have nothing to take account of in the science of the finite, except mere sequences of phenomena. Mr. Mill almost sneers at causes which are not subjects of experience to his senses. Then he sneers at every page of every treatise of mechanics or astronomy; for it is full of symbols well defined, that represent neither mere numbers nor phenomena, but forces, so far as is required to represent them for calculation. If these forces were phenomena, we could describe them exactly; but Newton declines all description of them. His words are—*Virium causas et sedes físicas non expendo*. Every phenomenon has both “a local habitation and a name,” as well as a cause. Newton declined to assign the *sedes físicas*, the shape, the phenomenal features, or local habitation of his forces, any more than their causes.

And will you deny that these forces are physical causes, which the physical philosopher must discuss? Yet Mr. Mill says distinctly, that he will allow no physical causes which are not phenomena, and will have no notion of a cause which cannot be gained by experience. Now, I think that Newton's symbol of the force of gravitation suggested to his mind, as it suggests to mine, a real thing, a real cause, which is no phenomenon, but which is something different from the number by which it is registered, from the masses and velocities on which it acts, from the spaces and times through which it acts, and from the accelerations which it produces. And this Mr. Mill would have us believe to be a metaphysical non-entity.

I beg to protest against the attempt which Mr. Mill has made to degrade the word *causation*. He has a perfect right

to shut out of his own view of nature and life everything but simple antecedence and sequence. It is also true, that there is a vulgar and unscientific sense in which one phenomenon is sometimes called the cause of another; but, in a book of philosophy, we do not expect to find words used in fundamental theorems in the most loose and popular meaning, misleading us by their contracted signification. And I am not aware, that the word *causation* has ever been employed by philosophers as expressing nothing more than the relation of antecedence, although an antecedent may be vulgarly called a *cause*. If Mr. Mill chooses to make discoveries about succession and nothing more, he has no occasion for the term causation. Succession, antecedence, and sequence, abundantly express his meaning. The word causation is one that science cannot spare, and cannot replace. It has been long established in philosophy as signifying far more than mere antecedence in order of time. Is it not wonderful to see it appropriated by a logician who has no use for it, and who thereby merely darkens and confuses his chapter on succession? Here is a philosopher of high position, known to be rolling in a wealth of words, and incapable of a felonious thought, who really cannot keep his fingers from a handy word that ends in *ation*, for which he has not the slightest occasion in the world! On ordinary principles this is utterly inexplicable. Is it a philosophical form of the new malady, *cleptomania*?

One word more. I have hinted at a charge against this author of something like unfairness, or rather I would say, distortion of the sentiments of those who differ from him. I am bound to prove this. The proof I will put into your hands in a moment. First let me cite again a passage from this chapter, § 7—"The state of the whole universe at any instant we believe to be the consequence of its state at the previous instant; inasmuch that one who knew all the agents which

exist at the present moment, their collocation in space, and all their properties, in other words, the laws of their agency, could predict the whole subsequent history of the universe, at least unless some new volition of a power capable of controlling the universe should supervene." Now, let me ask, would Mr. Mill like to be informed that, when thinking of the volition that can control the universe, he was thinking merely of a physical and phenomenal cause? Would he like to be told that, when bowing before the majesty of that thought, he was only performing, with the worshippers of Whydah, an act of Fetishism, in adoring a volition just like his own, which acts upon nerves, and through nerves upon muscles? Would he not have reason to feel offended at such language? And I, for one, have the same reason to feel offended, at the unworthy tone which he assumes in the close of this fifth chapter of his third book, towards those philosophers, who refer the universe of nature and life to a Divine Power and Volition as the efficient cause. The rest I am content to leave to those who may prefer to form their judgment of my remarks by reading for themselves the chapter which I have criticised.

A paper was also read, of which the following is an abstract :

HIGH-STREET, AND THE ROMAN ROADS IN THE NORTH-WEST OF ENGLAND.

BY THE REV. J. S. HOWSON, D.D.

THE author began by saying that he pretended to no very great acquaintance with the subject. He proposed to put together in one view a number of fragments, derived partly from his own observation, but chiefly from the researches of others. Thus, he hoped to be excused for presenting the subject in a conversational manner, instead of writing out a paper at length. He then defined the district to which he wished to invite attention. It extended from the celebrated Roman town at Wroxeter to the Western extremity of the Roman wall near Carlisle, excluding Wales on the one side, and Staffordshire, Yorkshire, and Durham, on the other. He remarked, by the way, that materials for a “*Cambria Romana*” were accumulating in the *Archæologia Cambrensis*, and that the Roman roads of Yorkshire had been laid down in a good map, published under the auspices of the *Archæological Institute*. Proceeding now to the materials to be used within the defined limits, he divided them into Literary and Monumental. Of the former there were two kinds,—the historical, such as the writings of Tacitus, and the records of the campaigns of Severus, or the rebellion of Carausius; and the topographical, such as Ptolemy, and especially the *Itineraries*, and the *Notitia*, which was described as a kind of “Red-Book” of the empire, after the division of east and west. Of the latter (the Monumental), there were again two kinds,—inscriptions, and the remaining traces of the roads themselves. He remarked that the *great* problem was to bring the latter into accord with the former, and he pointed out the difficulties which attend the combination of all these materials into one result. A tribute

of respect was here paid to the late Dr. Just, to whose perseverance and sagacity more is due, in this matter of the Roman roads of the northwest, than to any other researches. He spoke of his own acquaintance with Dr. Just, and observed that this gentleman's residence, in three distinct portions of his life, near Kendal, at Kirkby Lonsdale, and at Bury, all in the vicinity of Roman roads or Roman stations, probably contributed to form the taste for investigations of this kind. The various memoirs in which Dr. Just had recorded the results of his inquiries were also enumerated.

A map, enlarged from Horsley's *Britannia Romana*, and corresponding lists of the stations and distances in the second and tenth routes of *Antonine's Itinerary*, were hung upon the wall, as well as a map of the county of Westmoreland. Referring to these illustrations, he traced the Roman road at intervals from the neighbourhood of Knutsford and Altrincham to the crossing of the Mersey at Stratford, thence by Manchester (*Mancunium*) to Blackburn and to the Ribble at Ribchester (*Coccium*), which was visited in 1850 by the *Archæological Association*. Hence he observed that the road went north-east into Yorkshire, entering Lancashire again near Horsley, and soon entering Westmoreland, near Kirkby Lonsdale, thence passing northwards to the Roman station at Borough Bridge, thence to the other second station at Kirby Thore, and so finally by Newbiggin and over Crossfell, near Alston, to the Roman wall. In these latter portions of the route, he mentioned the parts which had come under his own observation, and contended that this line of road must be the tenth route of Antonine, whatever may be said of individual stations and intermediate distances. The cross-road from Carlisle by Kirby Thore towards York, and again out of Yorkshire, by Manchester to Chester (*Deva*), was similarly traced, and shown to correspond with the second route of Antonine, *Virtua* being Bragh, and *Lavatra* being Bowes. Another

cross-road was noticed, which is marked in the Ordnance Survey, as passing from the coast (at the *Portus Sistonium*) across the Fylde country by Kirkham and Preston to Ribchester. Remarks were made here on the authenticity of the work of Richard of Cirencester, who has a route corresponding with the line just mentioned. Another cross-road, further south, and traceable near Stretton, was also alluded to. Certain supplementary points were now discussed, such as the stations near Kendal and Ambleside, and especially the road over High-street, which Dr. Just thought was Saxon, but which he (the author) contended to be Roman. The remarkable physical structure of this range of hill was described, especially in its singular prolongation for many miles at a high and uniform level, and the command which it gives, not only of the valleys east and west, but of the open plains to the north and south. In this part of the paper, the characteristics of Roman roads were dwelt on; and it was especially noticed that they were lines of defence rather than mere lines of communication.

The paper concluded with some remarks on the connexion of these roads with the great physical features of the country, and on the similarity of ancient and modern names as a guide to the identification of stations. Thus, Pendle-hill and Ingleborough are great landmarks, evidently kept in view in the laying down of these roads. The Wrekin, again, gives the name both to *Uriconium* and Wroxeter (in Saxon, Wrekinchester). So *Bronovacæ* is evidently Brougham, *Aballaba* is probably Appleby, and *Alone* has very possibly some connexion with the Lune.

TENTH ORDINARY MEETING.**ROYAL INSTITUTION, 10th March, 1862.****DR. IHNE, VICE-PRESIDENT, in the Chair.**

Mr. C. O. ELLISON and Mr. RICHARD JONES were balloted for, and duly elected members of the Society.

Mr. JAS. A. PICTON, F.S.A., made some observations upon the arrangement and disposition of Roman encampments, as compared with British fortifications, illustrating his remarks by drawings of Pevensey Castle, and Porchester. These remarks had reference to the paper read at the last meeting by the Rev. Dr. Howson, on the Roman roads.

The following paper was then read :—

ON HAMLET AND FAUST.

BY REV. HERMANN BAAR, PH.D.

No dramatic works of modern times bear a greater resemblance to each other than Hamlet and Faust, the subject of the present paper. It would appear that the Teutonic spirit, penetrating with its world-wide ideas every human institution, and represented particularly by the kindred races of Germans and English, has found its most beautiful expression in these two masterpieces of Shakspeare and Goethe.

In both these works we see the gigantic strivings of two great and genial minds, seeking in vain to control, by the power of the thinking spirit, the duty and mission which circumstances and life had assigned to them. Whilst Hamlet in the performance of his moral duties, prompted by the voice of conscience, wavers at its warning whisperings, Faust, animated by that insatiable thirst after knowledge, lifts one curtain after another from the source of the infinite spirit, till, at length, convinced of the folly of his attempted audacity, he is hurled down into the sphere of earthly yearnings. There is so much written about these dramatic pieces, that it would be presumption in me to imagine myself able to bring forth new explanations for the right interpretation of either. But in studying so often these two standard works of our immortal poets, I have been struck with manifold ideas on *the spiritual affinity* prevailing through both. Permit me, therefore, by the following observations, more fully to enter into my theme, and to show wherein lies the spiritual affinity existing between Hamlet and Faust.

It is a principal law of the dramatic art, that the hero ought to be an energetic and acting character, strong enough to make a bold and firm stand against all influences from without.

Receptive and passive characters are more adapted for the epic poem and novel than the drama. Now, Shakspeare and Goethe have shown by the power of their genius that it is possible to create from undramatic heroes dramatic masterpieces. Hamlet and Faust are both reflective, pensive characters, whose "whole life is sicklied o'er with the pale cast of thought, and thus enterprises of great pith and moment lose the name of action." We have accustomed ourselves to seek in every eminent work of art a poetical idea, which, passing like a red thread through the whole, enforces upon us a moral or social lesson. The poet, the artist, the composer, in the hours of inspiration, when the torrents of genius are rushing upon them, are quite unconscious of this idea, and very seldom work after a preconceived plan or sketch. But the searching eye of the student, in order to appreciate more deeply the beauties of an artistic or poetical work, dives most anxiously for the dormant idea which it contains, and having been successful in these efforts, avails himself of this clue to enter more fully into the conceptions of the great mind. Thus Goethe, in his "Wilhelm Meister," was the first to give us a key to the penetration of Hamlet, when he says, that "in this drama a great duty or action is placed upon a soul which is not sufficiently skilled for the task required." "An oak tree is planted in a costly vase which should only have borne beautiful flowers in its bosom,—the roots expand,—and the vase is shattered." After him, Schlegel, Hazlitt, Gervinus, Coleridge, Ulrici, have tried with more or less ingenuity to illustrate this poem. Animated by such eminent men, and fully sensible of the brilliant light which they have cast over this mysterious work, we also, in the full consciousness of our humble capabilities, have attempted to search after the leading idea which it contains. We have found that it conveys to us the lesson "*Man in conflict with his conscience and duty.*" We shall now begin to adapt this idea to the whole structure of the piece.

Hamlet, Prince of Denmark, is called upon by the Ghost of a murdered father, to revenge his unnatural death, committed by his uncle, bearing now the royal crown, and recently married to his mother, the royal widow. This ghost, so personally represented, is nothing but the poetical embodiment of suspicion lurking in the heart of Hamlet, that a foul and treacherous act has been perpetrated by his uncle—"O my prophetic soul, my uncle." Hamlet promises his father that "his commandment alone shall live in the book and volume of his brain, and that with wings as swift as meditation, or the thoughts of love," he will hasten to his revenge. An energetic plastic nature, like Orestes, in the ancient drama, whose mother, causing the death of Agamemnon, lived in an unnatural alliance with her suitor, performed this cruel duty at once, and without hesitation; but Hamlet, a reflective, philosophical mind, anxious to carry out holily what he wishes highly, and imbued with the impressions of religion, which has "fixed its canon 'gainst self-slaughter" and murder, cannot do an act or duty conferred upon him *from without*, unless by the consent of his conscience *from within*. Thus he retards his duty for a while, hoping, in the meantime, to gain the assent of his inner monitor. The spirit that he has seen may be the devil, and "the devil has power to assume a pleasing shape." "He must have more palpable evidence for the truth of those revelations made to him." He has heard that "guilty creatures, sitting at a play, have, by the very cunning of the scene, been struck so to the soul that presently they have proclaimed their malefactions." His active mind embraces this idea at once. He will have grounds for the execution of his purpose more relative than those which are known to him. "Therefore, the play's the thing in which he will catch the conscience of the king." The play is performed,—the king is caught in the trap,—and Hamlet will take the Ghost's word for a thousand pounds. He is now prepared to do the awful

deed, for "it is the very witching time of night, when churchyards yawn, and hell itself breathes out contagion to the world." Even the occasion is favourable to him; he finds the king alone, anxiously seeking to relieve himself by prayer and repentance from the foul murder he had committed.

But Hamlet hesitates again. *Sophistic conscience* tells him that to "murder him now is hire and salary, not revenge." "He took my father grossly, full of bread, with all his crimes broad blown, as flush as May." "To take him in the purging of his soul, when he is fit and seasoned for the passage?" "No. Up, sword; and know thou a more horrid hent." After this, Hamlet follows the command which had summoned him before his mother. He appears there, works himself up into a passion, speaks daggers to the queen, and, hearing a noise behind the arras, he makes a pass with his sword, and kills—instead of the king, whom he expected to find there,—poor Polonius. This rash and hasty deed forms the crisis of the tragedy. Reflective Hamlet, so cautious in all his proceedings, and so anxious to act upon the broad base of right and justice, has roused the voice of conscience against himself. He has killed in his rashness an innocent man, and, instead of avenging bloodshed, has drawn bloodshed upon himself. From this moment, his presence in Denmark is no longer tolerated. He is sent to England with Rosencrantz and Guildenstern, who bear letters with them affecting Hamlet's death. These letters he draws secretly from their pockets, opens them, reads them, and writes other ones in their stead, in which he requests that the bearers should be put to death. Thus, at the expense of his *conscience* he sacrifices the friends of his youth, pacifying his better self with these words—"They are not *near my conscience*: their defeat does by their own insinuation grow: 'tis dangerous when the baser nature comes between the pass and fell incensed points of mighty opposites." When Horatio,

hereupon, exclaims—"Why, what a king is this!", Hamlet, after relating his uncle's wicked deeds, concludes with—"Is it not now *perfect conscience* to quit him with this arm?" After this, Hamlet returns to England, meeting his death at the hands of his unconscientious opponent Laertes; and in the image of *his cause* he saw the portraiture of *his own*, having before killed the king, who stepped in between the election and his hopes, the destroyer of all the most ardent wishes that had ever animated his soul. Is Goethe right in saying that the reflective mind is always possessed with conscience, and that the acting man is often one-sided and regardless of conscience? Then, it is even the intensity of conscience which causes Hamlet's irresolution and fall; and this is principally the reason why Hamlet, notwithstanding his weakness and hesitation, does not for a moment lose our sympathy and love. All the other characters of the piece may be brought under the one idea from which we started. Polonius, the courtier, is a man of *duty*, but not of *conscience*. He is devoted to his king and his children; but amongst the counsels which he gives to his daughter is one which savors of no conscience, "read on this book, that show of such an exercise may color your loneliness." "We are apt to blame in this, that with devotion's visage and pious action we sugar o'er the devil himself." Laertes, his son, is also a man of *duty*, but not of *conscience*. With the cry of "Where is my father?" he rushes upon the King and Queen, the most innocent objects of his incensed passion; and after having been pacified in his wrath, he agrees to fight with Hamlet, and to choose for this purpose, against all the laws of honesty and conscience, a sword unbated and envenomed. Even in Ophelia, there is more *duty* than *conscience*. Linked by ties of love to Hamlet, she listens to the voice of duty coming from her father's mouth to break off the engagement. Later, she allows herself to be set over Hamlet, even as a spy, to satisfy the curiosity of her father. Rosencrantz

and Guildenstern are mere instruments of duty in the hand of the King to be played upon. They lack advancement, and are, on this account, not at all scrupulous in making their consciences elastic. The only two characters in which *conscience* and *duty* are harmoniously blended are Horatio and Fortinbras. The former, Horatio, "is a man who, in suffering all, suffers nothing; a man that fortune's buffets and rewards has ta'en with equal thanks, and bless'd are those whose blood and judgment are so well commingled as not to be a pipe for fortune's finger to sound the stop she pleases." The other, Fortinbras, fighting for a little patch of ground—for a mere egg-shell—shows by this energy of purpose, that, "Rightly to be great, is, not to stir without great argument; but greatly to find quarrel in a straw, when honor's at the stake."

As Hamlet was anxious to control circumstances *by the voice of conscience*, so Faust was eager to bring life, with all its mysteries, *before the eye of knowledge*. The high flow of his thought carried him over the boundaries of that which is attainable to our mental perception, and made him forget that we live in a world whose mysteries are beyond all calculation of human understanding. Having neither power to confine his thirst after absolute knowledge, in the realm of the Infinite, nor energy to moderate his eager desires after absolute happiness in the realm of the Finite, Faust represents one of those Promethean figures, who, having stolen from heaven, celestial fire, and from earth, restless cravings after a state of perfect satisfaction, are continually trespassing on the limits of the Infinite and Finite, till, at length, life and experience fetter them for ever to the rock of renunciation. This is, according to our opinion, the idea of Faust. Let us follow up this idea. We meet Faust at first sitting in his study amidst papers, books, and instruments, seeking in vain to find out that absolute truth after which his soul yearns. Acquainted with every

branch of science, well versed in the various departments of philosophical and philological studies, endowed with all those feelings of refinement through which we appreciate the beautiful, he arrives at the conclusion that, with all our wisdom, we can "know nothing." Who does not remember here the beautiful words of Lessing, "If thou, my God, hadst in the one hand, absolute truth, and in the other, the striving after truth, I would say, the absolute truth, my God, is only for thee, give me the striving after truth." Dissatisfied with his vain attempts in search of knowledge, Faust,—for, "*les extrêmes se touchent*,"—plunges himself from the height of lofty notions into the maze of superstitious magic, that he may recognise the hidden ties that bind creation's inmost energies—

" Her vital powers, her embryo seeds survey,
And fling the trade in empty words away."

He opens the book of magic, written by the prophetic hand of Nostrodamus, to conjure to his assistance the earth spirit, "for unlocked the spirit world lies, &c." The earth spirit appears. Faust, with appalling fear, turns aside. He cannot even bear the sight, far less the words of the spirit—"Thou art like the spirit whom thou canst conceive, not me, for on the noisy loom of time I weave the living robe of God." Disappointed in his search after truth by the means of knowledge and magic, he is suddenly seized with a desire to commit suicide, "to cast off his mortal coil, and to fly through ether's wide dominions, to distant spheres of pure activity." But, in the moment when he places the goblet of poison to his mouth, choral voices and ringing of bells, announcing the 'Easter Feast,' draw away the glass from his lips. He listens to the Easter hymn, to the joyous pealing of the bells, telling of gay sports and festive hours in times of old, and "Recollection, fraught with child-like feeling, withholds his steps from the dark threshold of death." "Sound on, ye sweet heavenly strains! The tear is flowing—earth has me again!"

Faust, regained to life, and unsatisfied with the scanty gleanings of his reflective soul, leaves the gloom and dust of his lonely study to enter with new hopes the motley, varying scenes of the world. He rushes into the temple of nature to calm his palpitating heart at her sacred altar, and witnessing here the merry outbursts and peaceful enjoyments of students, peasants, citizens, shop-keepers, and mechanics, who, pleasure-laden, glide along, he at once moderates his eager desire after the penetration of truth, to seek with increased energy *in the world* for the joys of absolute happiness. "This, the world, is the people's genuine paradise, &c." But two souls, alas! are lodged within his breast, which struggle for undivided reign. "One to the world, with obstinate desires, still adheres: above the mist the other aspires, with sacred vehemence, to purer atmosphere;" and as he formerly conjured the earth-spirit to show him naked truth, so now he invokes the spirits to guide him through the world —

"Spirits, if you, indeed, are hovering near,
Wielding betwixt heaven and earth potential sway,
Stoop hither from your golden atmosphere,
And bear me to more varied life away."

"Call not the spirits that on mischief wait," says prosy Wagner to him; but Faust having yielded to the impulses and emotions of his heart, cannot recall the words he uttered. The spirit, which he conjures, fastens itself to his footsteps, assumes the shape of a poodle, and at length appears before him in the metamorphosed form of Mephistopheles. Mephistopheles, the spirit that always denies, is the necessary compliment to Faust's eccentric nature. The boundless assumption which likes to penetrate everything, and the foolish spirit of contradiction, are kindred neighbours; the only difference between them is, that very often our unsatisfied cravings terminate in sad melancholy, whilst the foolish spirit of contradiction seeks to dissolve the puzzling riddles of life by satirical and cynical criticism.

Faust makes a compact with Mephistopheles. He sells his soul to him for the promise to arrive through him at the enjoyment of absolute happiness on earth. "If ever with composed mind upon a bed of sloth I lay me ; when to the moment I shall say, thou art so lovely, stay—then with thy fetters bind me round." But such a moment can never happen. Every feeling, every joy, every knowledge, is finite, and, therefore, imperfect. Faust, allied to Mephistopheles, renounces "grey-beard theory to enter life fresh, green and golden." His mentor takes him to Auerbach's cellar to witness the jovial crew of students ; "with them each day a holiday, &c." "These fellows would not scent the devil out, e'en though he had them by the very throat." From this haunt of noisy merriment and sensual pleasure, Faust repairs with his companion to the kitchen of the witches to be made young again by an enchanted potion, which the sorceress reaches him. The liquor works wonderfully upon him, "and Cupid stirs and gambols in his heart." In this ecstasy of excitement, a magic mirror shows him the charming Helen of Greece ; and this appearance of Beauty captivates his senses, in such a degree, as to concentrate all his earthly ideals in her. He will acquire through her, (according to his view, that that which is real woman-like draws us upwards) that absolute happiness which he formerly imagined to gain through his studies. "Let me but gaze one moment in the glass ! too lovely was the female form." "Nay, Nay," says Mephistopheles, "as works the draught, you presently shall greet an Helen in each female form you meet." Faust sees Helen in Margaret, who, coming from church, carries away his ravished heart to rapture. He is very soon introduced to her by his evil companion and by the shrewd Martha, who both affect to bring about the close alliance between the two lovers, which at first raises them to the highest pitch of happiness in order to plunge them at a later period more rapidly and deeply into the abyss of misery.

The love-scenes between Faust and Margaret are drawn with the most beautiful colors of affection, passion, and simplicity. Child-like and innocent Gretchen, whose heart-strings vibrate in sweet music when touched by the breath of sacred vows, binds pensive Faust to the fascinating grandeur of her woman-like nature. She has a perfect sway over the object of her affection, and draws from him the most sublime thoughts on God and religion. To her question, if he believes in God, he answers—

“ Who dare name HIM,
 And who confess, I believe in Him ;
 Who can feel and force himself to say,
 I believe not in Him ;
 The All-embracer,
 The All-sustainer !
 Does He not embrace, sustain thee, me, Himself ?
 Does not the heaven arch itself above ?
 Lies not the earth firm here below ?
 And rise not the eternal stars,
 Looking downwards friendly ?
 Gaze not our eyes into each other,
 And is not all thronging to thy head and heart,
 Weaving in eternal mystery
 Invisibly, visibly about thee ?
 Fill up thy heart therewith in all its greatness ;
 And when thou art wholly blest in this emotion,
 Then call it what thou wilt ;
 Call it Bliss, Heart, Love, God ;
 I have no name for it ;
 Feeling is all in all.
 Name is sound and smoke,
 Clouding the glow of heaven.”

But these love scenes turn very soon into tragic scenes of mourning and misery. Innocent Margaret falls a victim to Faust's unbridled passion ; in her despair she kills the child she has borne ; and being condemned, in consequence of this crime, she pours out in her dungeon the most thrilling and agonising accents of a woe and fate which had blighted all the hopes she had cherished in her youthful heart. We are

reminded here of the beautiful words of Shakspeare—"Nature is fine in love, and where it is fine, it sends some precious instance of itself after the thing it loves." The sovereignty of reason leaves her in the most painful moments of her life, and although she is pardoned and saved, yet her rational faculties are not restored : she dies away as a plaintive song heard in a calm summer night.

Faust's unbounded thirst after absolute knowledge, and his unlimited desire after absolute happiness, find their ultimate defeat in his disappearing with Mephistopheles. But his disappearing with the Evil Spirit does not seem to us justified by the contract entered into. He sells his soul to Mephistopheles, on condition of arriving, through him, at the enjoyment of absolute happiness on earth. "If ever, with composed mind, upon a bed of sloth I lay me ; when to the moment I shall say, thou art so lovely, stay—then with thy fetters bind me round." But such a moment will never come to pass as long as our existence is bounded by earthly fetters. For this reason Faust and Mephistopheles have both lost their wagers. Moreover, the poet has failed to show us the perfect union which might exist between the striving after truth in the realm of the Infinite, and the enjoyment of happiness in the realm of the Finite ; and as we expected to see the manifestation of this idea carried out in the *second part* of Faust, we confess that in this respect our hopes were disappointed.

After having thus shown the leading ideas of Faust and Hamlet, we crave your attention for a few minutes longer to point out *the spiritual affinity* prevailing in these works. We have already observed that both the heroes, in consequence of their pensive and philosophical minds, were not fair specimens of a dramatic character—they are too much pervaded with the learned breath of Wittenberg, which, leading to lofty ideas and romantic notions of the heart, prevented them from every manly and energetic activity in that sphere of usefulness in which they

were placed. And with this there exists a similarity of opinions and tastes between them, as regards their religious feelings, their ideas on æsthetic eloquence, and their views on man.

Hamlet and Faust were *both religiously inclined*. The one, while contemplating suicide, is drawn away from the gates of death by the pealing of the Easter bells—the early remembrances of youth ; the other, reflecting on the same subject, was puzzled by “that dread of something after death, the undiscovered country, from whose bourne no traveller returns.” The one, Faust, looks upon the Bible as a book of Divine origin, for “nowhere is the heavenly radiance so beautifully displayed as in the Testament” : the other, Hamlet, finds in the very volume that the Everlasting has fixed his canon against self-slaughter. The one is drawn to unknown shores, to distant spheres of pure activity, by the flood-tide of his spirit : the other does not set his life at a pin’s fee, his soul being a thing immortal. The one does not like to make “sweet religion a rhapsody of words :” the other would lay down his life for that he loves, nor would he deprive any one of his feeling or his Church.

And the same similarity of opinion we find *in their ideas on æsthetic eloquence*. Both Hamlet and Faust advocate the strictest adherence to nature, as often as we are called upon to speak or to act in public assemblies :—“Do not overstep the modesty of nature, for anything so overdone is far from the purpose. Hold, as it were, the mirror up to nature—show *virtue* her own feature ; *scorn*, her own image ; and the very age and body of the time its form and pressure.” And similar ideas Faust utters : “A worthy object still pursue ; be not a hollow, tinkling fool ; good sense, sound reason, judgment true, find utterance without art or rule ; but that which issues from the heart alone will bend the hearts of others to your own.” Moreover, neither of the characters value highly the judgment of the motley multitude in regard to æsthetic

taste. The words of the one—"Do not tear a passion to tatters, to split the ears of the groundlings, who are capable of nothing but inexplicable dumb show and noise"—are responded to by the assent of the other:—

"Amongst mankind they oft indeed are found,
Who, what they do not understand, despise,
And what is good and beautiful contemn,
Because beyond their sympathies it lies."

There is also a similarity of opinion *in their judgement on man*. Both are sensible of the high and Godlike nature with which the Almighty has blessed the fragile mortal. When the one exclaims, "What a piece of work is man! how infinite in faculties! in form and moving how express and admirable! in action like an angel! in apprehension like a god! the beauty of the world! the paragon of animals!"—the other re-echoes these sentiments by saying, "I, God's own image! I, more than cherub, feel myself so small, so great. Alas! when on spirit wings we rise, no wings material lift our mortal clay. Thus our aspirations, our souls' genuine life, grow torpid in the din of worldly strife." At length, when the one likes to see man treated "not according to his desert, but according to our own honor and dignity," the other "would not care much for his life, if it be not possible to attain the crown of humanity;" that is, "to grapple in spirit with the highest and deepest, and to heap the weal and woe of the whole race upon his breast."

In addition to Hamlet and Faust's kindred natures in great thought and reflective powers, we find in Wagner and Polonius manifold characteristics, indicating their close relationship. The learned scholar, Wagner, and the grovelling statesman, Polonius, are both narrow-minded pedants, who, in want of feelings and thoughts of their own, borrow from others that spiritual currency with which they trade in life. When Wagner finds his highest authority in the parchment of a

Greek tragedy, and delights to see how a wise man has thought before him, old Polonius, with the courtesy of a courtier, draws all his happiness from the pleasing countenance of his royal master, to whom he looks up as the greatest oracle, and whom he serves *with all the energy of his principles*. It is true, Polonius gives excellent advice to his son and daughter; but, after all, narrow-minded pedantry has taken strong hold of him, for a man who will find out truth, though it were hid within the centre of the earth, must have indeed a strange and peculiar notion of himself. And yet this confidence in his infallibility leaves him, as often as he feels himself in the presence of minds superior to his own. Hamlet beautifully satirizes this weakness in the old man, when he says—" 'Do you see yonder cloud that's almost in shape of a camel?' 'By the mass, and 't is like a camel, indeed.' 'Methinks, it is like a weasel.' 'It is backed like a weasel.' 'Or like a whale?' 'Very like a whale.' " So Wagner, likewise, clings unflinchingly to the letter which *he* worships. The beauties of nature are only known to him from the books he studies. He says—"One soon looks over woods and fields," &c. He belongs to that class of men of whom Goethe, in the second part of *Faust*, says "that in their digging after scientific treasures, they find nothing else but earth-worms."

It remains to us now, finally, to show the affinity prevailing between Ophelia and Margaret. Both of these feminine characters are drawn with the most beautiful tints of love, truth, and devotedness; but Ophelia's love to Hamlet, although deep in its expression, is yet, after all, not free from conventional tinge. We form a just opinion of the depth of her affection by hearing her exclaim, "What a noble mind is here o'erthrown!" &c. "And I of ladies most deject and wretched, that suck'd the honey of his music vows, now see that noble and most sovereign reason, like sweet bells jangled, out of

tune and harsh—that unmatch'd form and feature of blown youth, blasted with ecstasy. O, woe is me! to have seen what I have seen, see what I see!" But, nevertheless, her love does not carry her to that height of affection, which, inspiring her with passionate energy, resists every attempt to withdraw her from the object of her choice. The obedience which she deems due to her parent stands paramount to the love she bears to Hamlet; and from this arises that passive resistlessness, through which she allows herself to be made an instrument in the hands of her father. Quite in opposition to Ophelia's calmness and regard of consequences, but kindred to her in deep affection and love, is Margaret. Her love, unbiassed by conventional or reflective consideration, is the purest expression of nature. She is a type of that womanhood whose representatives, without great learning or external accomplishments, draw forth from the fresh impulses of their hearts the finest essence of grace and loveable energy. She is aware, as she expresses herself, that her "poor prattle" cannot entertain a man of Faust's knowledge; but she is not aware, as Faust justly replies, that "simplicity and innocence, the highest gifts of bounteous nature, never appreciate themselves and their hallowed worth." With genial mastership the poet understood how to distinguish her by the most attractive features of womanhood. The words which she utters to Faust, "Only think of me one little minute—I shall have time enough to think of you," betray a world of love. Moreover, the poet has endowed her with that instinctive feeling with which feminine minds so often appreciate the good and beautiful, and thus exclude from their sphere everything which is derogatory to their tender, moral, and noble tastes. In consequence of these foreboding feelings, so peculiar to woman, Margaret appears uncomfortable and uneasy in the presence of Mephistopheles. "The man you have with you is hateful to me; nothing has given my heart such a pang as the repulsive visage of that

man ; his presence makes my blood creep. One sees that he sympathises with nothing ; it is written on his forehead that he can love no living soul. In his presence I should never be able to pray." Finally, both of these feminine characters resemble each other in point of that dismal fate which so suddenly descends upon them. Disappointed love entirely shatters the feeble frame of their nature, and, "most sovereign reason," leaves them in the moment of their greatest calamity.

How strange, and yet how strictly in accordance with poetical justice, is the reproach and punishment which falls at last on the faithless lovers ! Hamlet, in choosing the disguise of madness to arrive at the truth of his presentiments, has brought about real madness, in consequence of his behaviour towards the object of his affections. And Faust, the worshipper of reason, has extinguished the last spark of reason in that innocent mind, whose affections and feelings he debased so thoughtlessly.

In the discussion that ensued on the reading of this paper,

Dr. IHNE remarked that nothing could be more interesting than the comparison of two such works of art as Hamlet and Faust, which might be looked upon as representing the peculiar stamp of the English and the German mind as expressed in poetic art. He condemned as utterly untenable the attempts of those critics, who, like Gervinus and Ulrici, endeavoured to discover in each play of Shakspeare, a fundamental idea, which, in their opinions, it was written to illustrate. The fable of no Shaksperian play was constructed for didactic purposes. Shakspeare filled the fable as he found it with his poetic genius. His adherence to historical accuracy was throughout surprising. Goethe, on the other hand, had a theory to prove, and for this purpose he wrote Faust. In this he manifested the theoretic and subjective tendency of the German mind, as distinct from the objective and practical tendency of the English. The influence of the theoretic or didactic poetry of Germany was traceable in some productions of English poetry of the present century, as, for instance, in Byron's *Cain*. It had also been the fashion lately to write novels for the purpose of inculcating certain views on politics, religion, and society. This was opposed to the true principle of poetic art, and to the great model set by Shakspeare. Poetry could not be the handmaid of political economy, social science, moral philosophy, or metaphysics.

ELEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, March 24th, 1862.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

The SECRETARY gave some statistical information relative to the late *soirée*, at which upwards of 1,200 persons were present, and which appeared to have given entire satisfaction to the large assembly.

Mr. RICHARD R. RATHBONE was balloted for and duly elected a member.

CAPTAIN PETRIE, commodore of the Inman line of American packets, was balloted for and elected an Associate, on the recommendation of the Council.

Dr. COLLINGWOOD read the following letter he had received from Mr. J. P. G. Smith, relative to the brilliant meteor observed on February 23rd last :—

Spring Bank, Anfield, Liverpool,
25th February, 1862

My DEAR SIR,

Last Sunday evening, at 9.24, Greenwich mean time, a meteor of remarkable splendour and beauty flashed through about 70 degrees of the S.E. portion of the sky, and which I was so fortunate as to observe throughout its course. It first appeared in the constellation Coma Bernices, and, as seen from near to this house, it then crossed the stars δ Leonis and Regulus, and disappeared in the neighbourhood of Procyon. At about one third of the distance between Regulus and Procyon it broke up into two or more, of unequal dimensions. The light emitted was very intense, and of a bluish white colour, affecting the retina like that of the electric spark. Sirius, though shining with its usual brilliancy, seemed quite red and dim in comparison with it. The road and neighbouring objects were illuminated very distinctly—some people near to me at the moment remarked that the light was

equal to that of the full moon. Its motion was extremely rapid, for its whole course was run in little more than two seconds, but it left behind a train or bar of white light, which remained visible for a period of from two and a half to three seconds after the ball of the meteor itself had disappeared, and by means of which I was enabled to note its path. Should any member of your Society have noticed this beautiful phenomenon carefully, it would be exceedingly interesting to compare their observations of its course in the sky with the above record, and more especially if the locality in which they may have observed it should have been remote from Liverpool, as we may, by means of the combined observations, be able to make a proximate estimate of its distance from the surface of the earth.

I am, DEAR SIR,

Yours very faithfully,

J. P. G. SMITH.

C. COLLINGWOOD, Esq.

A paper was then read by Dr. NEVINS, V.P.,

ON THE FERTILIZATION AND RIPENING OF SEEDS.

This paper was copiously illustrated, and listened to with great interest and attention. The author referred to a number of plants, chiefly aquatic, for the purpose of explaining the manner in which fertilization was effected, in spite of numerous difficulties, more particularly the danger of the pollen becoming wet, which was destructive to it. He showed also how the bending of the stalk in one case, its erect aspect in another, as well as other apparently unimportant characters, exercised a great influence upon the well-being of the plant,—in fact the slightest character could often be shown to be essential to the preservation of the race.

TWELFTH ORDINARY MEETING.

ROYAL INSTITUTION, 7th April, 1862.

The REV. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

The following gentlemen were balloted for and duly elected members of the society:—

Mr. R. RANKIN, (Chairman of the Dock Board,)
 Mr. JOHN CAMPBELL,
 Mr. C. J. ENGLISH,
 Mr. ALEXANDER NEWLANDS,
 Dr. EWING WHITTLE,
 Mr. JAMES M. CAWKITT,
 Mr. HENRY SAMUEL, and
 Mr. T. H. WILLANS.

It was moved by Mr. PICTON, and seconded by Mr. TOOKE:—"That the thanks of the society be presented to the Rev. H. H. Higgins, Dr. Ihne, Dr. Edwards, Messrs. Clark, Baruchson, Redish, and C. Spence, who formed the working committee, for the very able and successful manner in which the Jubilee Festival was conducted."

Also, "That the thanks of the society be conveyed in an especial manner to the Honorary Secretary, Dr. Collingwood, for the great zeal and energy he displayed, and to whose valuable and continued exertions the success attending the Festival is in a great measure due." This resolution having been put to the meeting, was carried by acclamation.

The PRESIDENT exhibited a specimen of *Lepidostrobus*, the fruit of the extinct *Lepidodendron*, found near Rainhill.

Mr. NISBET exhibited a collection of seaweeds and zoophytes, made at Hobson's Bay, Australia.

Mr. MOORE exhibited a remarkably fine specimen of the Red Bandfish, (*Cepola rubescens*,) caught alive at Seacombe, on the 29th of March, and presented by Mr. R. M. Corless, to the Free Public Museum. It is very long and narrow, being about 16 inches in length by 2 deep, and 1 inch thick, tapering gradually to the tail, which ends in a mere point. When living it was of a beautiful rose pink colour, but this tint faded entirely away on the death of the animal. This specimen is believed to be the first that has occurred in the Liverpool district. Though common in the Mediterranean, it is exceedingly rare as a British fish, such specimens as have been captured having generally occurred after a storm in early spring.

The following paper was then read :—

THE KARAITES: THEIR HISTORY AND LITERATURE.

BY REV. C. D. GINSBURG.

EVERY observant traveller who has visited the Crimea, Lithuania, Southern Gallicia, &c., must have noticed some moustached beings, with extremely narrow lines of whisker winding their way from the lower part of the chin, across the artery, passing by the ear right up as far as the hair will grow, with a Tartar costume and Jewish face, and very clean and neat in appearance. Almost every stranger asks, "Who are these?" and the reply is, "They are Karaites." But when the intelligent traveller asks further, "Who are the Karaites?" "Where do they come from?" "What is their history?" he will receive no satisfactory answer. Very few persons can tell us anything about them. A paper was lately read upon the Karaites, before the British Association at Aberdeen, and also before the Royal Society of Literature, by John Hogg, Esq., M.A., foreign secretary of the Royal Society of Literature, in which this gentleman said that the object of his essay was not so much to impart information as to elicit it. We therefore propose to give a *brief outline* of "The Karaites, their History and Literature," as the limits of this paper do not admit of more.

The Jewish community, which had been split up twice before, into Israel and Judah during the first temple, and into Pharisees and Sadducees during the second temple, sustained a third calamitous rupture, when the *Karaite* or *Bible Jews*, having renounced the traditions of the Rabbins, and the Rabbinical Jews declared war against each other, about the

middle of the eighth century. To understand the rise and progress of this very important but very much neglected Jewish sect, called the Karaites, it will be necessary briefly to trace the cause of the struggle and final separation.

The Jews from time immemorial have believed in an *oral* law, which, they say, God communicated to Moses on Mount Sinai, and Moses to the elders and teachers, the Rabbins of Israel, to supplement, explain, or modify the *written* revelation, as changing circumstances or different ages may require. The Rabbinical or oral law is divisible into three classes. The **FIRST** consists of laws *absolutely traditional*, communicated by God to Moses, and by Moses to the Rabbins, apart from, or side by side with, those recorded in the written word of God. **SECOND**, laws obtained from the Bible by *traditional rules* of interpretation, independent of those rules of language to which all other written documents are subject; and **THIRD**, laws which they have the power to enact or modify. To substantiate this claim, the Jews appeal to the fact that the whole system of accentuation and vowel points, whereby we are enabled to decipher the meaning of the Bible, rests upon tradition—that the sacred canon is accepted upon tradition—that certain injunctions are given in the Holy Bible in so concise a manner that they could not possibly be carried out without some more specific oral explanation, as to the way in which they were to be obeyed; as, for example, what constituted work on the Sabbath? what was a Sabbath-day's journey? how and with what is circumcision to be effected? what are the clean and unclean animals referred to in Leviticus xi, 8, and Deut. xiv, 12? and many more instances might easily be adduced. There can therefore be no doubt that Moses and the elders and teachers whom he appointed must have given some oral instruction, as to the manner in which these rites were to be practised, and in which exceptional legal cases were to be treated. Now the Jews maintain that this oral law is contained in their *Talmud* and *Midrashim*.

The extraordinary powers wherewith the Rabbins, or teachers of Israel, were endowed were fraught with extraordinary dangers, which in course of time threatened to destroy the very oracles they claimed to uphold. By the secret keys they possessed, the Rabbins were enabled to unlock the Bible, and obtain from it a multiplicity of rites, ceremonies, and laws, which almost entirely buried the Scriptures themselves—thus “loading men with burdens grievous to be borne.” (Luke xi, 46.) Hence the origin of the Sadducees, a sect which gradually formed itself, about two centuries before Christ, of those Jews who rejected the traditions, and adhered to the letter of the Bible, and who sowed the seed of Karaism, the harvest of which was gathered by *Anan*, about 761 of the present era.*

The exact time when *Anan*, the son of David, the renowned founder of Karaism, was born, cannot now be ascertained. All that we know about it is, that his uncle Solomon, who was Prince or Patriarch of the exiled Jews, died childless, in 761 or 762 A.D.; that *Anan* was the legitimate successor to the Patriarchate; and that he was then old enough to become the Prince of the captivity: so that he was then most probably about thirty years of age. He was, however, prevented from obtaining the Patriarchate, by the brothers *R. Jehudai*, the blind, and *R. Dudai*, who were at that time the Gaonim, or the Presidents of the Academies, (the former being President of the Academy at Sora, from 759 to 762, and the latter of the Academy at *Pumbadita*, from 761 to 764,) because he rejected the traditions of the fathers, and made the Bible alone the rule of his faith, and his younger brother, *Chananja* (or *Achurai*), was elected in his stead.

* The great similarity between the Sadducees and the Karaites cannot here be described for want of space. Suffice it to say that I. Kirkissani, who simply reiterates the opinion of older writers, holds the two to be identical. דע כי אם שהיה החלוקה היתה בבית שני ריד הרבנים מנצחות חזם הדעות במדעים ריד הקדמים נחלשה חזם הדעות צדקים ; *Pinsker, Likute Kadmonijoth. Supplement, p. 84.* In fact the Sadducees are actually called *Karaites* in the Talmud according to a certain reading (Comp. Megilla 246; Jerusalem Megilla iv, 9) which does not at all appear improbable since they too adhered to the Scripture (קרא).

But Anan was not to be punished with impunity. There were multitudes who could not see the truth of Rabbinical Judaism ; these sympathised with Anan in his sufferings for conscience' sake, they recognised in him the champion of their principles, and gathered round him as the legitimate Prince of the captivity. The schism was now fairly created. The Rabbinical party, who had great influence with the then Caliph Abugafar Almansar, succeeded, however, in driving Anan out of Babylon. He retired to Jerusalem, where he was followed by his children, his friends, Obadaya of Bazra, Genai ben Baruch, Chanocha, Ephraim, Jehudah from Persia, Malich, &c., and where he established a synagogue. The warfare now began in full earnest. The Rabbinic Jews formally excommunicated Anan with his party ; and Anan again declared, he wished that all the Rabbinical Jews were in his body, he would then destroy himself, so that they might die with him. He prohibited his followers from intermarrying with the Rabbinists, taking any meals with them, visiting their synagogues, and having any intercourse with them. He exerted his great Talmudic learning to show the Talmudists that they had corrupted the Jewish religion, that they had palmed upon the Scriptures many things which were not to be found therein, whilst they abrogated others which, according to the literal meaning of the Bible, were unalterably binding upon the nation.

Anan now energetically applied himself to the elucidation of the principles by which he and his followers were to be guided. To this effect he wrote three works, viz. :—(1) a commentary on the Pentateuch, which was the first literal exposition of a portion of the Bible ; (2) a summary of religious duties (both these were written in the Aramœan dialect) ; and (3) a volume entitled *Fadhalka*, which was most probably written in Arabic. It is greatly to be regretted that all these works have become a prey to time, and that we are thus deprived of the primary sources of information respecting the

character of Karaism in its infancy. From the few surviving quotations, however, made by later Karaite writers from his works, we gather the following to be some of the principles propounded by Anan, the founder of Karaism.

1. His cardinal doctrine, or distinguishing tenet, was, "Search the Scriptures deeply;" thus entirely excluding all tradition, and making the literal teaching of the Bible the only infallible source and test of religious truth and observance.

2. He accordingly maintained that the phrase "to-morrow after the Sabbath," in Leviticus xxiii, 11, must be taken in its literal sense, as denoting the ordinary or weekly Sabbath. For the better understanding of this important point, we must remark that the Rabbinites explain this term in the passage before us in a secondary sense, as denoting the first day of the Passover itself, which is *a day of rest* (שבת); that this traditional explanation is followed by the Septuagint, the Chaldee of Onkelos, Josephus (Antiq. iii, x, 6), the Chaldee paraphrase of Jonathan, and many of our English divines; and that by it the time of the celebration of two festivals is regulated. Now the Rabbinic Jews to this day, following the traditional and secondary sense of the word sabbath, celebrate the *oblation, or waving of the sheaf of barley* (חגפת עומר), on the second day of the Passover (i.e., Nisan, March 16), and the feast of Pentecost on the fiftieth day after it (i.e., after the sixteenth of Nisan), irrespective of the day of the week. Whereas the Sadducees of old, and the Karaites to the present day, rejecting the traditions of the fathers, and adhering to the literal sense of the term sabbath, have the *oblation or waving of the sheaf of barley* literally on "the morrow after the Sabbath," that is, on the Sunday following the first day of the Passover; and have the feast of Pentecost on the fiftieth day after it, which must therefore also always be on a Sunday.

3. He therefore also rejected the calendar introduced by Hillel II, and re-instituted the scriptural beginning of the month, which is when the new moon appears.

accentuation and vowel points, as we have it in our Hebrew Bibles, originated about that time. The Rabbinic Jews seeing that their opponents, the Karaites, had made such progress in Biblical knowledge, and could wield the Scriptures as a most dangerous weapon against the traditions of the fathers, were driven in self-defence also to apply themselves to the study of the written word of God. Both parties were thereby greatly benefitted. The Karaites, however, for a time remained masters of the field. Such was their progress in sacred hermeneutics, and such their desire to approximate as closely as possible to the teachings of the Bible, in conformity with the new results of Biblical researches, that they and their chief, the son of their founder, willingly submitted, about 800-810, to the reformation of their doctrines effected by Benjamin Nahavendi.

Here again we have to lament that all the writings of this immortal reformer of Karaism are lost, except one entitled *Dinim* (דינים), and that it treats exclusively on penal and civil laws. From the epilogue of this work, however, we learn that this truth-loving and liberal-minded man frankly confesses that "much good will be found in the traditional jurisprudence of his opponents." "Whoso among the Karaites," says he, "prefers to be guided by the Rabbinic enactments upon these matters, let him do it." Again, speaking about the frequent changes made in Karaism in so short a time, when the son of the founder was still alive, Benjamin declares that Karaism, so far from prohibiting, actually enjoins that the principles of religion should be investigated more and more, and be made more conformable with the Bible. "I am no prophet," says he, in a fragment which has survived from another work of his,* "nor the son of a prophet, and all intelligent Karaites

* ואמר בנימין וגל במאדחת מספר אבי בנימין אחד מאלף אלפים ורבי רבנות לא דברתי ולא נביא אנוכי ולא בן נביא וכן כל חכם מן הקראים לוקח זה הדרך וכתבו מה שהתבוננו כי הוא אמת ויצו לאנשים להבחין ולנחות ויש שידליק אה על אחיו וכן על אב ולא אמר האב למה החלפת דברי וכן החלמיד למלמד ולכן יצאו מידי חובה והם נצולים מלפני ד' ואע"פ שיעבור מהם שגגה במקצת דבריהם וספריהם ויש להם שכר גדול על אשר גלו והאירו עיני האנשים

Literatur-historische Mittheilungen ueber die aeltesten Hebräischen Exegeten, Grammatiker, und Lexicographen, von Leopold Dukes. Stuttgart, 1844, p. 27, &c.

have declared they wrote what they thought to be the truth, and they have enjoined their followers to examine and test their teachings. Hence a brother may differ from his brother, a son from his father, and a disciple from his master, and the parent will not say to his child, why hast thou altered my teaching? provided it is based upon further research."

The following are some of the changes which Nahavendi introduced into Karaism :—

1. He relaxed Anan's rigorous law respecting the observance of the Sabbath, and urged that one may go about the city within a Sabbath-day's journey, if circumstances require it.

2. He limited the obligations of the Levirate law, extended by Anan, and confined it to *actual brothers*.

3. He maintained that a husband has the right of inheriting his wife's property.*

The many other changes which he introduced cannot now be ascertained. So great was the admiration which the sect had for the great reformer, in consequence of his Scriptural teaching, that they discarded the name Ananites, and henceforth called themselves KARAITES (קראים) that is, *Scripturalists*, or *Bene Mikra* (בני מקרא), *Baale Mikra* (בעלי מקרא), followers of the Bible, in contradistinction to *Baale Ha-Kabala* (בעלי חקבלה) followers of tradition.

But the Karaites did not stop here. The distinguishing principle of their creed, that the Bible, and the Bible alone, is the sole source and test of religious truth, precluded the possibility of their regarding the explanations of it by any man or set of men as the infallible teaching of the word of God. As long as the Karaites remained true to this principle, they could not look upon their views as finally settled. They were convinced—and would that we had the same conviction, and acted according to it—that as the study of the original language of the Bible becomes more general, and as the science of

* Graetz, Geschichte der Juden. Magdeburg, 1860, vol. v., p. 507, &c.

grammar and lexicography progresses, some things will be disclosed, which require modification, alteration, or reformation. However much, therefore, they venerated their founder, Anan, and their great teachers, they were prepared to sacrifice everything for the declarations, "It is written," "Thus saith the Scriptures." They thought they should violate the spirit and design of their reformers, by settling down to a stereotyped, immovable, and unreformable system of creeds.

Hence we find two more epochs, distinguished by great reformations, between the period of *Nahavendi*, 800-820 A.D., and the year 900. Not ashamed of truth, nor afraid of being charged with constant changes, nor apprehending that the frequent alterations which truth and conscience alike demanded, would unsettle the minds of the multitude, or bring down the whole religious edifice upon their heads, Salomon ben Jeracham, the celebrated Karaite commentator upon the Bible (who was born 885, and died in 960), frankly records these reformations in the following words: * "Anan first came forward (761) and roused the hearts of men, because the customs of the Rabbins and the study of the Talmud made them forget the law of Jehovah and its true wisdom. Then appeared Benjamin Nahavendi (flor. 800-820), who, with increased exertions, disclosed points with respect to which Anan had still followed the customs of the Rabbins. Then again, after Benjamin, came forward the Karaites, and made hedges round the commandments of God. Then came men from the East and the West, who fortified the law still more; these determined to settle down in Jerusalem, they left their possessions and

" ובמלכות הרביעית נתגלה ענן והעיר לבות האנשים ופתח עיניהם והתאוו לתורת ה' במדת מה שהשתדלו בהו' לפי שהיה מנהג הרבנים והתעסקותם בגמרא כבר משכיחים אותם תורת ה' והבנת האמתיות ממנהו אח"כ נגלה בנימין והוסיף חיזוק (פואד תאיד, צ"ל תאיד) וגלה דברים שהיה ענן ירחמיהו אל נגוד בהם אחר מנהג הרבנים, אח"כ נתגלו אחרי בנימין הקראים והוסיפו נדרים במצות ד' ואח"כ עמדו אנשים ממזרח ומערב והוסיפו ההזקקה בדת והשקידה בחורמה (ואלאגת האד האלעם, צ"ל באלעם) ושמו מנמת סניהם לשבת בירושלים ועזבו רכושם וביתם ומאסו בע"הו' והם הנמצאים בעת בירושלים' לקומי קדמוניות מאת שמחה פינסקער דף כא, כב

This masterly work will create a new epoch in our literature on the Karaites.

homes, they despised this world, and these are the men who are now found in Jerusalem."

The great progress which the science of Biblical interpretation made during the 10th century, at which we have now arrived, in tracing the history of Karaism, and the still more rapid strides of this science during the 11th, 12th, and 13th centuries, as well as the mighty Rabbinical opponents (such as Saadia Gaon, Ibn Ezra, Maimonides, Jehudah Ha-Levi, &c.) whom this separation had to encounter in these centuries, alike tended to consolidate Karaism, and to render its doctrines more settled. From this period, therefore, we may look upon Karaism as finally fixed, both in its opposition to Rabbinism, and in the fundamental articles of faith by which its followers demand to be judged.

As to its opposition to Rabbinism in the present day, we cannot do better than give the words of R. Caleb, one of the most distinguished Karaite writers of the fifteenth century, upon this subject.

1. "The Rabbinists maintain," says Caleb, "that many injunctions were delivered *orally* to our teacher, Moses, which were transmitted from generation to generation, till a time came when they were written down, because fear was entertained that they might be forgotten. But we Karaites do not believe it. We maintain that what it pleased God to reveal to his faithful servant was written down, as is evident from many passages of the Bible.

2. "The Rabbinists maintain that the Bible requires an exposition, and this exposition is contained in the oral law. But we do not believe it. We maintain that all the written laws contain their own explanation. Where things are briefly expressed, the Bible reckons upon the intelligence of the reader. Every expression is designed to convey the meaning of the speaker, else it is of no value. How then can we suppose that God intentionally expressed His will in an unintelligible

manner in *His written word*, in order that he might give his proper meaning *orally*? Moreover, it is written that "the law of the Lord is perfect," and if it required a supplementary exposition, it would be very imperfect. Besides, any one would have the license to explain the Scriptures according to his fancy. If the Rabbinites were to say that their traditions simply affect laws which may easily be misinterpreted, it might be tolerated, but they go far beyond the contents of the Bible, and contradict its teachings.

8. "The Rabbinites maintain that they have the power to increase or diminish the precepts of the law, and that the sages have at any time the right of demanding obedience even when they declare right wrong and wrong right, or when they err unintentionally or intentionally. But we do not believe it. Alterations of any kind are most distinctly prohibited. As to the fact that we regard certain usages as duties, though they are not explicitly stated in the Bible, and explain others figuratively which appear to be stated in the Bible, this is the result of a true investigation of the spirit of the law. For this is the province of the wise and penetrating, who can arrive at intelligent conclusions. When the Bible enjoins that we are to yield obedience to successive judges, it is because the Word of God presumes that the judges possess the intelligence to interpret the written law, and not because they are in possession of a tradition. The falsity of these pretensions to a tradition is evident, moreover, from the fact that the pretended possessors of it diametrically oppose each other in their explanations."

II. As to the fundamental articles of their creed, by which the Karaites demand to be judged, they are ten, and generally given in the following order:—

1. *The whole material universe is created, that is, made out of nothing.*

2. *There is one Creator, who has neither been created by*

any one else, nor by himself. This is the result of the preceding article, for it is only the spirit that moves without an external impulse ; whilst all bodies can only be set in motion by an impelling power. We must therefore necessarily presuppose an ante-mundane and uncreated spiritual Being.

3. *This Being has no form, is in every respect one, and does not resemble any of the existing beings.* A plurality would constitute a limit, as well as necessitate a form, and this again a cause. God is therefore free from every property. All the prophetic expressions which contain such require an explanation. Hence some of them negative all predicates, whilst others are positives, e.g., omnipotent, omniscient, living, willing, existing, &c., just as we ascribe powers to the sun. But this does not contribute to our knowledge of *the Being*.

4. *God has sent our teacher, Moses.* The necessity of a revelation through the medium of a perfect man, who does not learn truth by being instructed, but by immediate inward perception, arises from the fact that all other instruction is imperfect.

5. *God has sent the law by Moses, and this law contains throughout unconditional or perfect truth.*

6. *It is the duty of every one to learn the law in the original Hebrew, and that both in its linguistical department, and according to the sound laws of exegesis.*

7. *God has also revealed himself to the other prophets, in divers manners and at sundry times.*

8. *God will raise the dead in the day of judgment.* There is, however, a difference of opinion about the particulars of the resurrection. Some think that both body and soul will be raised conjointly, to receive the award of everlasting bliss or misery ; whilst others believe that it is *the soul alone* which will have everlasting joy or anguish.

9. *God will render to every man according to his deeds.* This doctrine is intimately connected with the belief in a

general and special Providence, whose ways we do not fully know, as well as with the consciousness of a *moral* and *free will*, which pre-supposes responsibility.

10. *God will redeem His people from their captivity, and send them the Messiah, the Son of David.* He will either be king, Messiah, and prophet himself, or Elias the prophet will come with him. The Messiah will not alter the world, nor perform miracles, but restore the temple and the holy city to His people, after having vanquished their enemies. The time of his advent cannot be ascertained, but the belief in his coming is an essential element in the preservation of His people, and in the service of God.

Whoso believes these ten articles is a true Karaite, though he may fail or err in other respects ; but he who denies them, or one of them, does not deserve the name of brother, even if he keeps the whole law.*

We must now conclude with a few remarks respecting their colonization, present localities and numbers. The Mahometans, who greatly admired the Karaites, and were extremely favourable to them, were the cause of their settling down in different parts of the world. The Karaites accompanied the Mahometans to Africa and Asia Minor—they followed them to Spain, Antioch, Edessa, and Nice—they went with them to Eastern Europe—had at first their chief colony in Adrianople, and thence branched out into Constantinople. It was also through the kindliness of the Turco-Tartars that they settled in the Crimea. Though all the colonies in Asia and Africa flourished greatly during the thirteenth and fourteenth centuries, yet there is hardly a trace of them now to be found in these parts of the world. There are none in the towns of Asia Minor, Syria, nor on the Northern coast of Africa, except

* Jost, *Geschichte des Judenthums und seiner Secten*. Leipzig, 1858, vol. ii., p. 800—838.

Kahira and the Southern province of Morocco. The Talmudic Jews, who out-numbered them, contrived to bring about their emigration from these settlements. In the Southern part of European Russia alone have they been able peacefully to maintain themselves. Their habitations and numbers in the year 1649 were as follows :—

| | |
|--------------------------|-------------|
| In Poland | 2000 |
| Constantinople | 70 |
| Theodotia | 1200 |
| Cairo | 800 |
| Damascus | 200 |
| Jerusalem | 80 |
| Babylon | 100 |
| Persia | 600 |
| | <hr/> |
| Total | <u>4500</u> |

Their present number is estimated at about 4,000.* About 1,500 reside at Djufut Kalè, about 800 at Eupatoria, 200 at Odessa, about 30 in Theodotia; some are also to be found in Vilna and other parts of Lithuania, in Nicolagen, Taganrog, and Cherson. Out of Russia, we meet them again in Gallicia, where they have two synagogues, under the protection of the Austrian dominion. Then again there are about 150 in Constantinople, upwards of 200 in Kahira, only four families in Jerusalem, and in Nit, a town in Syria, about 250.†

Everywhere their morality is unexceptionable, their honesty and general probity in the transaction of business with their Jewish, Christian, or Mahometan neighbours, are proverbial. No vice nor crime is known among them. The records of the police in Russia show that no Karaite has been punished for an offence against the laws for four centuries. Both the Russian and Austrian Governments, as a reward for their high integrity and great industry, have conferred privileges

* This is the account given by Professor Legerus of Geneva, in a letter addressed to Hottinger, *Thesaurus Philologicus*, Tiguri 1649, p. 583.

† Kohl's *Reisen in Südrussland*, 1847, vol. ii., p. 81, &c.

and immunities upon the Karaites, which are denied to the Rabbinical Jews, and sometimes even to their Christian fellow-subjects. It is a matter of fact that there is no community upon the earth, among Jews or Christians, Mahometans, Chinese or Indians, which, in point of cleanliness, sobriety, industry, honesty, and morality, can be compared with the Karaites. It is a problem well worth the study and solution of the Literary and Philosophical Society, that we English, with all our Christianity, with a constitutional government, religious, philanthropic, and other institutions, which are unparalleled among the nations of the earth, even we must shrink from a comparison with the Karaites.

THIRTEENTH ORDINARY MEETING.

ROYAL INSTITUTION, 21st April, 1862.

The Rev. H. H. HIGGINS, M.A., PRESIDENT, in the Chair.

The following gentlemen were balloted for and elected members of the Society :—

Mr. JAMES SMITH, Seaforth,
Mr. F. L. HAUSBURG,
Mr. WILLIAM LASSELL, JUN., and
Mr. SAMUEL BULLEY.

It was announced from the Council that arrangements would be made for the members and their friends to dine together, at a suitable place, at the close of the session.*

Mr. Moore exhibited a specimen of the Flying Squid, (*Ommastrephes*), captured off Douglas Head, the nearest point to Liverpool at which it has yet occurred.

Dr. Edwards made some remarks upon the constitution and properties of the American Rock Oils, accompanied by specimens.

The following paper was then read :—

* This gathering of the members and their friends took place on Monday, June 9th, at Childwall Abbey Hotel. The guests, to the number of thirty, assembled on the Bowling Green at Four o'clock, being favored with delightful weather. Dinner being announced, the Chair was taken by the President, the Vice-Chair by Dr. Ihne, Senior Vice-President, the centre of the table being occupied by the Secretary. Amongst those present were Messrs. Picton, E. Fletcher, E. Harvey, Higginson, Byerley, Redish, Andrews, A. Newlands, Professor Cranbrook, Drs. Walker, Rogers, E. Whittle, Imlach, &c. The cloth having been removed, and the usual loyal toasts drunk, Mr. Harry A. Ewer proposed "Success to the Literary and Philosophical Society," which was duly honoured, and responded to by the President, who alluded to the recent Jubilee Festival, the flourishing state of the Society, and his own forthcoming withdrawal from the Chair. "The Kindred Societies," were proposed in a humorous speech by Dr. Ihne, and responded to by Mr. Picton. Dr. Collingwood proposed "The Friends and Visitors," who had graced the gathering with their presence, and to whom he wished no worse than that they might speedily become Members. Mr. Behrend responded. "The Honorary Secretary" was proposed in a very complimentary speech by Mr. Redish, and drunk with musical honors. Dr. Collingwood acknowledged the toast in a suitable reply, in which he dwelt upon the small proportion of men of influence who were to be found in the ranks of the Society, and on the revivification of science which had taken place in Liverpool during the last few years. Dr. Ihne in conclusion proposed "the Ladies," paying a high compliment to those of his adopted country, to which Dr. Walker responded with a word in favor of the Esquimaux, and Dr. Rogers for the Tartar Ladies.

The festival passed off with great success and satisfaction, and the company left the room about Eight o'clock, to spend the remainder of the fine evening upon the Green, and in the pleasant neighbourhood of Childwall. The President read a letter from the Mayor, in which he expressed his regret that the Town Hall duties prevented him from being present.

CONTRIBUTIONS TO BRITISH ORNITHOLOGY.

No. 2. MIGRATION.

By CUTHBERT COLLINGWOOD, M.A., F.L.S., &c.

THE subject of the migration of birds is one which, in all ages, has possessed a more than common interest, an interest not confined to the Ornithologist, but shared alike by all of those who derive pleasure from the sights and sounds of the vernal season,—who watch for the first swallow, or who hail the welcome note of the returning cuckoo. But although the leading facts of migration have thus been thrust upon the attention of most persons, the philosophical explanation of all its phenomena has not made corresponding advances; and most persons have contented themselves with believing that many birds fly over sea and land to visit us in spring, wearily and toilsomely returning as winter approaches—to which not a few have added as an article of faith, that the active swallow, whose rapid evolutions have delighted us in summer, lies cold and dank during winter beneath the surface of a neighbouring pond.* As much of error as of truth has laid its hold upon men's minds, and the object of the following paper is to arrange and digest the facts of migration, with the endeavour to place the subject in the position it occupies at the present time.

Divested, however, of all superfluous mystery, the subject is confessedly difficult, not in general plan, but in its details, many of which are puzzling in the extreme. Let us first offer a brief sketch of what that general plan undoubtedly is,

* For an illustration of this, and of several other points referred to in this paper, the reader is referred to a paper by the Author in the "Proceedings of the Liverpool Literary and Philosophical Society," No. XIII. p. 128, entitled "A comparison between some Ancient and Modern views of the migrations and habits of Birds."

before proceeding to the discussion of some of the most interesting phenomena in detail.

The fact that those birds which *winter here* (except in those very rare instances which only serve to prove the rule) *never breed* with us, may be regarded as the key to the migratory movement. Just as the eggs of the Redwing and Fieldfare are not found in this country, so we may judge by analogy, having no proof whatever to the contrary, that those birds which, in the spring, come to us from the south, do not breed *there* as well as here. Birds, in short, at the season of reproduction hasten northwards to those spots where they were themselves reared, and where, perhaps, they have already previously nested, and there they pair, build, and bring up their young. This business finished, they again, with their progeny, retire southwards to those regions, the temperature of which is more in accordance with their natural feelings, and where food is probably more abundant, at all events at that season ; and there they remain until sexual impulse bids them repeat their northern journey. The regularity of their times of departure and arrival is doubtless the result of an unerring instinct connected with their individual feelings with regard to the business of reproduction, and, like other instincts, incapable of being reduced to any Procrustean rule. Thus, for example, the Fieldfare and the Redwing (boreal, or winter birds) are driven northwards from us in April by the same impulse which brings the Nightingale and Blackcap (summer birds) to us from their sunny abodes in the south—all, in fact, alike retire before the advancing sun in spring to a more equable and temperate latitude—all seek those regions where they themselves were hatched, there to rear their prospective young ; and this business at length concluded, they all alike follow the receding sun, and quit the latitudes no longer constitutionally fit for them ; the Fieldfares, Redwings, and the like, content with and easily enduring an English winter,

the Nightingales and Warblers, unable to exist under conditions of temperature less mild and equable than are found beneath an Andalusian or African sky.

Thus then the *Sun* is the great moving power, and the *Equinoxes* are the signals for the movement of migration. As long as the sun is south of the equator the birds of the northern hemisphere, like the rest of nature, are quiescent—but as soon as in his return journey he reaches the (vernal) equinox, symptoms of restless and busy activity appear among them. At the summer solstice the northern hemisphere receives its full share of the sun's genial influence, and birds, in common with all nature, are in the height of their activity. As the sun retires southwards again, the vital influences decline, until it has again reached the (autumnal) equinox, when the birds at once prepare to follow him.

It will thus appear that there are two distinct migrations in the year—a *spring* one and an *autumn* one—in other words a northerly one and a southerly one; but it must be borne in mind that the direction of migration is in all cases the same at *the same time*, viz., northwards in spring, southwards in autumn; and that a similar geographical area is at all times preserved between winter and summer birds of passage.

But if we go a step farther back in the train of causes, we shall find that there appears to be a distinct impulse for each migration. The migration northwards in spring is apparently determined by the development of the reproductive organs, which at that season attain their full size in birds, that development being determined by temperature. The decadence of sexual instinct, however, does not appear to be sufficient cause to induce the birds to return southwards, but a failure both of temperature and of food, would be amply sufficient to determine a revisitation of their winter quarters. The failure of food, however, is most frequently less evident than that of temperature, and it has been matter for speculation

and remark, that birds perform their autumnal migration *before* the necessary food fails—hence, it has been argued that this cannot be regarded as a cause. But inasmuch as such failure in the case of insectivorous birds, *must* occur sooner or later as autumn advances, the signs and symptoms of it may readily be conceived to be more patent to the birds than to us. Their numbers are increased by the growing up of one or more young broods, and the supply of food must inevitably be diminished. Indeed it may be considered that there is nothing more wonderful in their leaving on account of a *prospective* failure than in their migrating at all;—the same instinct, with which all are gifted, is equally powerful, and equally sufficient.

If, however, we search for an ultimate cause for the phenomenon of migration, we can only refer it to the different degrees of physical hardiness of birds—a complicated phase of geographical distribution. Endowed with powers of locomotion not limited by the natural boundaries of sea and land, they enjoy facilities for change of residence unshared, except to a comparatively slight extent, by the tenants of the earth's surface, and they are thus enabled to exist within wider geographical limits than otherwise would be possible. Both summer and winter birds of passage are constitutionally too delicate to flourish, or even to live (as a rule) if permanently restricted to their northern summer quarters, but their power of changing them under the influence of the migratory instinct increases their own sphere of enjoyment, and affords the inhabitants of these, and other more northerly climes, the pleasures and benefits arising from their presence amongst us.

That the migratory character exists in birds as a powerful instinctive impulse is proved by the behaviour of caged birds at the season of change of quarters. They are restless, impatient, and uneasy, and although plentifully supplied with food, and in comfortable quarters, they are not content, but exhibit

evident signs of a strong desire to join in the movement taking place among their more fortunate brethren out of doors. On the other hand, it is evident that this strong impulse is instinctive, and, like other instincts, insufficient for special cases. It is limited in its character and duration to a short space of time, and a peculiar season, so that birds which have already performed a long journey to their winter quarters may perish from the severity of the season, but have no further impulse to travel more southwards.

It will be convenient to regard our migratory birds under four aspects, viz.:—

1st, as arriving in this country (in spring).

2nd, as residents in this country (in summer).

3rd, as quitting this country (in autumn).

4th, as residents of some distant country (in winter).

First, then, let us consider their arrival here in spring. In comparing the dates given by different observers of the arrival of the various summer birds of passage, very considerable discrepancy occurs. The most complete tables I am acquainted with are those made by Gilbert White, at Selborne, Markwick, at Battle, in Sussex (with which they are usually placed in juxtaposition), and the Rev. L. Jenyns, at Swaffham Bulbeck, Cambridgeshire. Each of these observers gives the mean of many years observations, but so various and discrepant are the results thus obtained that I have long ceased to regard them as any guide or criterion; indeed, there is more than a month's interval between the *mean* dates of these observers for *the same bird*. One cannot fail to be struck with the very early dates given by White, at Selborne. With him, the influx of summer visitors appears to have commenced in the middle of March, and to have been at its height in the beginning and middle of April. Mr. Sweet, in his "British Warblers," gives earlier dates than old Gilbert White, and I presume

his observations referred to the immediate neighbourhood of London.

With regard to Markwick's dates, I can only say that if any one will compare them with those of White, a striking discrepancy will be apparent ; for although he lived and made his observations near Battle, in Sussex, a spot considerably to the south and east of Selborne, nevertheless, the birds were with him seldom less than a week, generally a fortnight, and sometimes even longer, in arriving at Battle, after the date of their appearance at Selborne.

The best *modern* observations are those of the Rev. L. Jenyns, which are to be found at the end of his "Observations in Natural History." The dates of this calendar, made at Swaffham Bulbeck, in Cambridgeshire, are collected with care, and are, many of them, the *means* of twelve, or even twenty years' observation, and may, therefore, fairly be taken as an average. These dates are, in many instances, however, a fortnight later than those recorded by White, although Swaffham is only about the same distance from London in a northerly, as Selborne is in a westerly, direction.

My own observations, made in several successive years, at Blackheath (south-east of London), have generally shewn a mean between those of White and Jenyns ; and to me, Jenyns' dates appear almost as *late* as White's do *early*.

The reason of these discrepancies I conceive to be—that the experience of a single individual is liable to fallacy—that he may not have the same opportunities of accurate investigation in two consecutive years. Consequently, certain dates, in a long series of years are *much too late*, and these, when reduced to a general mean, destroy the balance of the whole. For this reason, I was led to suppose that a comparison of the *earliest* day on which each observer first noticed a bird, would be productive of more equable results, and the observations of six ornithologists are here collected for the purpose of

shewing how much better they agree as to their *earliest observations* of the various birds. (Vide Table). And the reason is plainly that *that* observation was probably made under the best circumstances, and therefore, most in accordance with truth; besides which, the comparatively slight variation renders it highly probable that the dates of arrival of birds of passage are more constant than a comparison of the mean of the observations of White, Markwick, and Jenyns, would seem to indicate. In the majority of instances there is but a difference of a week or so, except in the case of some birds, the date of whose appearance is, from local causes, irregular. Moreover, these earliest dates are very much more in accordance, on the whole, with what my own observations induce me to believe the true periods.

It may be objected that the *earliest* dates do not fairly represent the times of arrival of the main body of the visitors, inasmuch as they only record the advent of individual birds, which may have been considerably in advance of the rest. In answer to this objection, I would urge, first, that the arrival of the earliest bird is a definite observation, while that of the "main body" is an indefinite one, and one which it would be next to impossible to observe with accuracy; and, second, the probability that the individual birds, first noticed, did not arrive as solitary stragglers, but as members of the first *flock*, which may have scattered themselves on reaching our coasts.

As a result of the table, which shews the *means* of the earliest dates given by three observers situated at or near one spot, Bromley and Blackheath, I have no hesitation in presenting the following as the order of arrival of migratory birds in the immediate neighbourhood of London:—

| | | |
|---------------|--------------------|---------------------------------|
| <i>March.</i> | Chiffchaff, | (<i>Sylvia hippolais.</i>) |
| <i>April.</i> | Blackcap, | (<i>Curruca atricapilla.</i>) |
| | Willow Wren, | (<i>Sylvia trochilus.</i>) |
| | Wryneck, | (<i>Yunx torquilla.</i>) |
| | Swallow, | (<i>Hirundo domestica.</i>) |

TABLE OF MEAN EARLIEST ARRIVAL OF MIGRATORY BIRDS.

| EARLIEST DAY OF APPEARANCE, ACCORDING TO | Chichester. | Tree Pipit. | Willow Wren. | Redstart. | Blackcap. | Swallow. | Nightingale. | Whinchat. | Wynneck. | Whitethroat. | Sedge Warbler. | Lesser Whitethroat. | Cuckoo. | Martin. | Yellow Wagtail. | Garden Warbler. | Wood Wren. | Band Martin. | Turtle Dove. | Swift. | Grasshopper Lark. | Flycatcher. | Red-backed Shrike. | Goatsucker. |
|---|----------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|------------------|------------------|------------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-------------------|------------------|-----------------------|-------------|
| WHITE. (Selborne, Hants.) | Mar 19 | Ap 9 | Ap 14 | Ap 8 | Mar 26 | Mar 26 | Ap 1 | .... | Mar 5 | Ap 14 | May 4 | .... | Ap 7 | Mar 28 | .... | .... | Ap 17 | Mar 21 | Ap 20 | Ap 13 | Ap 16 | May 10 | .... | May 1 |
| MARKWICK. (Battle, Sussex.) | Mar 30 | Ap 14 | .... | Ap 5 | Ap 14 | Ap 7 | Ap 5 | .... | Mar 26 | Ap 14 | .... | .... | Ap 16 | Ap 14 | Ap 18 | .... | Ap 28 | Ap 8 | May 14 | Ap 28 | .... | Ap 29 | .... | May 16 |
| JENYNS. (Swaffham Bulbeck, Cambridgeshire.) | Mar 15 | Ap 7 | Ap 5 | Ap 6 | Mar 28 | Ap 9 | Ap 8 | Ap 18 | Ap 20 | Ap 14 | Ap 15 | Ap 17 | Ap 21 | Ap 15 | Ap 28 | May 1 | May 2 | Ap 20 | Ap 27 | May 6 | .... | May 13 | .... | .... |
| HUTCHINSON. (Blackheath.) | Mar 11 | Ap 12 | Ap 3 | Ap 5 | Mar 28 | Ap 6 | Ap 8 | Ap 15 | .... | Ap 13 | .... | Ap 12 | Ap 22 | Ap 1 | .... | May 2 | .... | .... | May 9 | May 2 | .... | .... | May 11 | .... |
| RAWSON. (Bromley, Kent.) | Ap 1 | .... | .... | Ap 16 | Ap 8 | Ap 11 | Ap 11 | Ap 12 | Ap 3 | Ap 14 | .... | .... | Ap 16 | Ap 22 | .... | .... | .... | .... | May 7 | May 10 | .... | May 8 | May 8 | .... |
| COLLINGWOOD. (Blackheath.) | Ap 1 | Ap 11 | Ap 9 | Ap 9 | Ap 4 | Ap 14 | Ap 16 | Ap 15 | Ap 10 | Ap 10 | Ap 16 | Ap 21 | Ap 18 | Ap 9 | Ap 21 | .... | Ap 30 | Ap 15 | .. | May 10 | Ap 17 | May 6 | .... | .... |
| Mean of earliest dates. | Mar 22 | Ap 11 | Ap 9 | Ap 11 | Ap 5 | Ap 5 | Ap 9 | Ap 15 | Mar 28 | Ap 13 | Ap 25 | Ap 17 | Ap 15 | Ap 10 | Ap 21 | May 1 | Ap 25 | Ap 5 | May 2 | Ap 27 | Ap 16 | May 6 | May 7 | May 9 |
| Mean of the last three Observers. | Mar 22 | Ap 11 | Ap 6 | Ap 11 | Ap 3 | Ap 10 | Ap 12 | Ap 14 | Ap 7 | Ap 12 | Ap 16 | Ap 17 | Ap 19 | Ap 12 | Ap 21 | May 2 | Ap 30 | Ap 15 | May 8 | May 6 | Ap 17 | May 7 | May 7 | .... |
| JENYNS—Mean of () years. | (7) Ap 8 | (16) Ap 20 | (21) Ap 15 | (16) Ap 15 | (19) Ap 16 | (12) Ap 19 | (20) Ap 21 | (8) Ap 24 | (7) Ap 24 | (11) Ap 25 | (12) Ap 25 | (12) Ap 26 | (12) Ap 27 | (12) Ap 30 | (6) May 3 | (9) May 4 | (8) May 4 | (6) May 7 | (9) May 8 | (12) May 18 | .... | (8) May 16 | .... | .... |

| | | | |
|---------------|---|------------------------|-----------------------------------|
| <i>April.</i> | { | Tree Pipit, | (<i>Anthus arboreus.</i>) |
| | { | Redstart, | (<i>Phoenicurus ruticilla.</i>) |
| | { | Whitethroat, | (<i>Currucula cinerea.</i>) |
| | { | Martin, | (<i>Hirundo urbica.</i>) |
| | { | Nightingale, | (<i>Philomela luscini.</i>) |
| | | Whinchat, | (<i>Saxicola rubetra.</i>) |
| | | Sandmartin, | (<i>Hirundo riparia.</i>) |
| | | Sedgewarbler, | (<i>Salicaria phragmitis.</i>) |
| | { | Lesser Whitethroat, .. | (<i>Currucula sylviella.</i>) |
| | { | Grasshopper Lark, .. | (<i>Salicaria locustella.</i>) |
| | | Cuckoo, | (<i>Cuculus canorus.</i>) |
| | | Yellow Wagtail, | (<i>Motacilla flava.</i>) |
| | | Wood Wren, | (<i>Sylvia sylvicola.</i>) |
| <i>May.</i> | | Garden Warbler, ... | (<i>Currucula hortensis.</i>) |
| | | Swift, | (<i>Cypselus apus.</i>) |
| | { | Spotted Flycatcher, .. | (<i>Muscicapa grisola.</i>) |
| | { | Redbacked Shrike, ... | (<i>Lanius collurio.</i>) |
| | | Turtle Dove, | (<i>Columba turtur.</i>) |

But even when all fallacies of observation are eliminated, there still remains something unaccounted for. The most careful observations prove that the arrival of birds of passage is *modified by some circumstances*. If Instinct were infallible and unvarying, I think we might safely judge that migration would take place, either always on the same day of the year, or at all events that the period would be confined within very narrow limits. We can have no doubt that birds are influenced to a certain extent by external circumstances, which impel them, in some seasons, to make their appearance here before the average time, and on the other hand, delay them in other seasons. *Temperature*, we have seen, has a most important influence, mediate or immediate, acting through their feelings, their sexual development, or their means of subsistence. So little are we acquainted with the import of the very common term Instinct, that we are unable to speak dogmatically as to the *rationale* of its action; and consequently we are unable to determine how slight an influence—slight, that is, apparently to our reasoning powers, may act powerfully upon instinctive feelings, and make all the difference whether a bird

shall accelerate or retard his time of migration. Again, it being granted that temperature is the grand cause of the migratory movement, mediate or immediate little matters, the question next arises, *where* is the temperature to act? if it may be so expressed—whether at the point from which they set out, or at that towards which they are tending? Now it would certainly exceed our ideas of the limits of Instinct, were we to suppose that birds quit a southern climate a fortnight earlier than usual because the spring is more advanced than usual in that country whither they are repairing;—in other words the variation of climate in a country cannot possibly influence the birds that are yet in a distant region.

This argument is rendered necessary by the very prevalent idea that the early arrival of spring birds indicates an unusually early season. Nothing is more common than to hear it stated that the somewhat earlier appearance of the cuckoo or the swallow is due to the unusual mildness of the weather. Whereas, when calmly considered, it will be perceived that the arrival of migratory birds, whether earlier or later than the average time, should be entirely irrespective of the forwardness or backwardness of the season here; and this statement is borne out by facts.

Doubtless there are circumstances which modify instinct in this matter; but these influences must be looked for in the climate of the country in which they are wintering. Meteorological tables fully prove that temperature and climate, apparently the most unstable of influences, have yet a degree of uniformity in the main. The barometer is subject to fluctuations and changes of a compensating character, and a heaped-up atmosphere in one spot indicates a depressed barometer somewhere else. The thermometer also is no less variable day by day, but constant in long periods and over large tracts. The mean temperature of a country is pretty equable, however much it may vary in different seasons; so

also the mean temperature of a large tract of country, say a hemisphere for example, may be assumed to be even more constant, however much it may vary in its regional parts, so that a forward or backward spring here is no criterion whatever of the state of the season ten degrees south. If the spring is premature *here*, it *may* or may *not* be (the latter hypothetically more probable) the case that the North of Africa is warmer than usual at that season; but if it is, an early spring here would not hasten the arrival of the migratory birds, nor would a backward season retard them.

Thus, we find in some cold springs that the birds are seen to arrive at the usual time in spite of the inclemency of the weather, but almost immediately disappear again, apparently concealing themselves, more or less, for some days, until a more genial temperature supervenes. The frequent observation of this fact has indeed, doubtless, given countenance to the old *hybernation* theory. On the other hand, in some seasons, the spring is remarkably forward and warm, but the birds do not arrive until late. Thus, the temperature of the first three weeks of the year 1845 was two degrees below the mean for 48 years;* yet the Chiffchaff arrived in the neighbourhood of Blackheath, April 2nd, the Willow Wren, April 7th, the Swallow was seen, April 6th, and the Nightingale heard on the 13th. The temperature of the first week of April, 1848, was 11° *above the average*, and of the second week, nearly 20° *below* it; but in two or three lists of birds in that year, I find nothing remarkable—no influx of birds to this country on the 2nd, 3rd, and 4th days of the month, when the thermometer stood 19° above the average (61° instead of 44°). The earliest record of the Swallows for that year, indeed (by Mr. A. Newton), is for the 8th, the thermometer being that

* These averages of temperature are all derived from a very interesting paper in the Report of the Meteorological Society, for 1857, by my friend, James Glaisher, Esq., F.R.S., "On the determination of the mean temperature of every day in the year, from 1814 to 1856;" deduced from the Royal Observatory thermometrical observations.

day 6° *below* the average. So also, in 1854, the mean temperature of the whole month was 2° above the average, yet in my list of arrivals for that month, I find nothing striking. Some birds, it is true, were slightly early, but others were equally late.

The spring of 1855 was notoriously a late one, the winter having been very prolonged and severe. Residing during the month of April in Berkshire, I remarked at the time that the arrival of summer birds of passage was in very few cases retarded, whereas, in the majority of instances, they made their appearance before the average time ; and a list placed in juxtaposition with the average times given by the Rev. L. Jenyns, was decidedly in favour of the former.

On the other hand, it is equally true that in 1857, though the spring was forward and warm, and everything seemed to invite them to accelerate their journey, their advent was, for some cause or other, singularly delayed ; up to near the middle of the month they made their appearance pretty regularly, when something seemed suddenly to interrupt the regularity of their arrival. Days passed, beautiful sunny days, and the Swallow, Martin, Blackcap, and Titlark, which were all due, failed to make their appearance. On the 19th, I strolled along the river side as the most likely locality to observe the missing birds. One single swallow rewarded me, but I saw no more for a week ; the Blackcap did not arrive till the 24th, and the Martin some days later.

These facts prove, then, if proof be necessary, that the influence which causes the irregularities in the migratory movement of spring, must be sought for, not in the irregularities of temperature of this climate, but in some distant cause acting upon them, probably in the countries in which they have wintered, and accumulating its effects as spring progresses.

It is very probable that birds are assisted or impeded in

their migration by the winds—brought more speedily in one season, retarded, or driven out of their course in another. This was well known to the ancients, who gave the winds blowing at this time of the year the name of Ornithian winds, (Arist. Meteor., 2, 5), and sometimes Chelidonian winds, on account of their bringing the favorite swallow.

It is generally considered that the lines of migration follow a direction as nearly as possible parallel to the parallels of longitude, that is, in a direction almost, if not quite, *due north*. I do not think that the spread of migratory species, locally, *in our island*, can be fairly regarded as a proof of this,

of the Nightingale from Cornwall and I do not think that that bird's most westerly course is defined. In fact it is absolutely impossible hereafter to be mentioned, of the time of migration, using the same place. I think that observed facts lead to the conclusion that the lines of migration have a direction, that is, from southeast to north-west. The presence in Ireland of many of our species, may, I think, be fairly taken as a tendency, inasmuch as we could scarcely allow, Chiffchaff, Whitethroat, Sedge-warbler, regularly in that island, were migrating.

The intervention of a sea, of twice the width of the Dover would be amply sufficient to prevent birds from passing to that island; and although they are occasionally driven over the channel they should not expect to find them there in any numbers with as much regularity as in this country. If we are to consider the British islands as lying far from the general route of migrants, it is not surprising that there are many small facts, which, taken together, lead to the conclusion that the migration is generally in a westerly direction.

I once myself observed a distinct act of migration which bears out this view. The 11th of April, 1851, was a cold and wet day, the temperature being $3\frac{1}{2}^{\circ}$ below the average, and for a week it had been nearly 5° below it. On that day, I crossed to Boulogne, and travelled by railway to Paris (south east). I had not seen a single swallow in England, and the first account I have of them is, that they were observed in the Isle of Wight on that very day. In France, however, the weather was bright and genial, and I soon became aware of parties of *Hirundines* meeting us at short intervals, and flying in a direction exactly the reverse of that in which I was proceeding. In short, for the whole distance between Boulogne and Paris, I met repeated small flocks uniformly flying in a north-westerly direction. A careful observation of them, during several hours which the journey occupied, scarcely revealed a single one flying in the opposite direction; except, indeed, as we passed towns and villages, where they appeared to be resting and hawking about for insects—having already, perhaps, taken up their abode at their old haunts. The uniformity of their flight was most striking, and interested me exceedingly, inasmuch as I felt convinced that I was witnessing one of those periodical movements.

Having said thus much about the times of their arrival, let us next briefly consider the physical condition of the migrating birds on reaching this country. Although among mammalia there is a certain periodicity in the sexual impulse, this intermission is much more distinctly marked in birds, inasmuch as during winter they are virtually, and almost literally, emasculated, so that the physical condition of the bird at these two seasons is totally different. It is probably the development of the reproductive organs in spring, determined by temperature, which brings them here, and certain it is that at the time of their arrival, they are fully prepared to undertake the duties of pairing and incubation. Most of our indigenous birds, capable

of flourishing under an inferior temperature, have already commenced these operations, before their migratory brethren join them, and these follow as soon as they can meet with mates—so that it may be fairly inferred that the migratory birds are in the highest and most perfect physical condition when they perform their spring migration. Thus, also, song, which, in its perfection, accompanies this high physical condition (probably depending upon, or at all events, co-existing with, the fullest development of the reproductive organs) is, I believe, perfected when they are first seen here. Among indigenous birds, song long precedes the processes of nidification and incubation, gradually increasing in strength and character until the month of April. But the migratory birds arrive in full song. This is a fact of which I am persuaded from repeated observation; and it is of some importance, because, since we can much more readily detect the presence of a bird by the ear than by the eye, it follows that if they arrive in song, we are justified in dating their arrival from the day they proclaim it by their song. Probably, a day or so may be safely allowed for recovery from the fatigues of the journey, as I have reason to believe such fatigue to be, at all events, sometimes incurred, and for the following reasons:—I have more than once, when watching with great vigilance for the first appearance of the migratory birds in April, at length detected the presence of the Willow Wren and Redstart, either by seeing the birds, or by hearing just so much of their note, perhaps only once repeated, as would render it difficult for one not accustomed to such sounds to identify it, inasmuch as it might be described as a mutilated version of the song, which resembled in its character the recording voice of a young bird in autumn. But although this was the only indication of the bird's arrival on the occasions to which I refer, *the next day* every tree-top gave forth, in the case of the Willow Wren (*Sylvia trochilus*), its well known restless note; and in the

case of the Redstart (*Phoenicurus rubricollis*), a less common bird, the occurrence, though confined to narrower limits, was no less striking, and left me convinced that on the first day they had just arrived, and that temporary fatigue, or some similar cause, had alone prevented them from singing, recovering which on the following day, they had burst into full song. I shall again have occasion to refer to this subject.

We do not observe, during the short period of six weeks or two months which they spend with us in song, any gradual improvement, though we do perceive a very distinct and gradual deterioration in their vocal powers; and in this point, as well as in many others, we may be assisted in coming to a right conclusion by the analogies of indigenous birds, and of those which spend the winter with us. These latter, it is well known, commence singing before they leave us in spring for the north.

II. We will now proceed to consider migratory birds in their summer aspect, as residents in this country.

The majority of birds arrive in this country by the south-east and south coasts, and gradually spread themselves through the country. They appear, however, to distribute themselves but slowly. Mr. Selby, of Twizell, in Northumberland, "considers, from repeated observations, that with all our summer visitants there is a difference of ten days or a fortnight between their arrival in the southern and northern parts of the kingdom." Now as Northumberland is about 840 miles north, in a straight line from the south coast of England, this would give an average of about thirty miles a day for their progress through the country.

There can be no reason to doubt that many individual birds at least return to the same spots which they have occupied in the previous season. The numerous instances of birds nesting in situations of great singularity during successive

years, and the well-known occurrence of a certain coppice or tree being haunted in successive seasons by the nightingale, or other birds, is sufficient proof of this ; and more special instances are on record, such as the case related by Mr. Blyth of the return of a lame Redstart to the same spot for sixteen consecutive seasons. Dr. Jenner's experiments upon marked Swifts also, are conclusive upon this point. Indeed when calmly considered, it is scarcely more wonderful that they should find their way back to the same spot, (a spot with which they must be perfectly familiar if they have bred, or been hatched there, in a previous season,) than that they should find their way back over tracts of sea and land to this country at all.

It is not a little remarkable however that some parts of our island, apparently the most favoured, are never visited by certain birds, as the nightingale, which not only does not travel further north than York, but also bounds its western peregrinations by the county of Devon. Besides this, Mr. Rodd, of Penzance, (Zoologist, 7050) remarks that the Garden Warbler, Lesser Whitethroat, Reed Warbler, and Redstart are never seen there. It is difficult to conceive the reason of the absence of these birds from the sheltered spots and the mild climate of this district. Mr. Rodd however mentions another curious circumstance, viz., that several birds, previously unknown in the district, had made their appearance all at once, and continued afterwards to affect the same localities. As examples of this extension of local distribution, the Blackcap, Willow Wren, and Wood Wren are mentioned.

In connection with this part of the subject it is a noticeable circumstance over how wide a geographical range some of our summer visitors distribute themselves. Thus the Swallow is found not only here in summer, but also in Norway, Lapland, and even the southern parts of Siberia, according to Pennant.

The Cuckoo also is found in Siberia, and even the Swift ventures as far north as Norway and Lapland. But we may be sure that the birds remain but a short time in proportion to the distance north to which they migrate. Thus the Swallow arrives at Upsal, May 9th, and quits it Sept. 17th, according to Alexander Berger, and Linnæus informs us that the Cuckoo inhabits Lapland from the 18th May to the 10th July, whereas in the warm and sheltered south-western parts of England, the Cuckoo remains till October.

It would seem, indeed, that while the species as a whole experiences the migratory impulse, individuals of the species experience it in very different degrees. In some, the exigence of the impulse is satisfied by a journey to this country, or even perhaps short of it—in others it drives them, like the Furies pursuing Orestes, further and further North to the very limits of their constitutional endurance. Under some conditions, indeed, it appears to be abolished altogether, so that birds which are migratory in some countries, appear to be stationary and resident all the year round in others. Thus certain of our summer visitors, as the Swallow, Martin, and Swift, are said to remain the whole year at Sierra Leone—while others, of our residents, as for example, the Thrush, are migratory in other countries.

Taking, however, our own island as a basis for argument upon their movements, to which probably it is entitled from its central position and temperate climate, but without wishing to lay it down as a *law* of migration, I would yet suggest for the confirmation or otherwise of future observations, that the period of time during which a bird remains in this country in summer may be taken as an index of the distance southwards to which he retires for the remainder of the year. This period is so widely different in different birds, that I have sought for a reason of the apparent anomaly, and would suggest the above as an explanation.

Here again we receive some assistance from analogous phenomena in the distribution of our indigenous birds. Thus, just as certain internal migrations take place within the limits of this island—birds, that is, which are indigenous with us, but more abundant in the north, retire farther south during the severest weeks of the winter season, immediately returning when the frost is over—so I cannot help believing that those summer birds of passage which remain longest with us, depart a shorter distance from us during the winter, than do those which spend with us only the hottest months of summer. The internal migrations to which I have alluded, are perhaps regulated by no other law than that of frost and snow—the birds retire before these agents, and remain at these southern limits only so long as these last—and when they cease, be it for a shorter or a longer period, they return. Their migration therefore, while it is confined to the *narrowest limits*, is also performed in the *shortest time*. Instancing from our true summer visitors, it will be sufficient to adduce two birds as examples of what I would convey. The Swift (*Cypselus apus*) arrives here in the middle of May, and while it is the latest to arrive, it is also the first to disappear; after three short months it takes its departure, in the middle of August; but the diminutive Chiffchaff (*Sylvia hippolais*) on the other hand sometimes makes its appearance in the middle of March, and does not depart until the middle of October, thus remaining with us the largest half of the year. From this I deduce, arguing from reason and analogy, that while the Chiffchaff might be found in winter at a comparatively short distance south of this island, it would be necessary to go *much nearer to the equator* to find our Swifts at that season. (*Vide Postscript.*)

The tenderness of constitution of the birds which visit us in summer, and their inability to endure any sudden diminution of temperature, is well illustrated by the fatal effects which

follow any unusual cold during the time they remain with us. Thus, on 7th May, 1853, at Much Wenlock, Salop, two pairs of Willow Wrens were found dead upon the ground, which was partially covered with snow. The temperature of this day was 38° , the mean temperature being $52^{\circ}8$, so that it was $13^{\circ}7$ below the average. On 31st May, 1855, after a severe night, Swallows and Martins, to the number of many hundreds, were found at King's Newton, Derbyshire, and generally over the Midland Counties. The temperature of May 30th was $43^{\circ}7$ (mean $55^{\circ}1$; difference, $11^{\circ}4$); on May 31st, it was $45^{\circ}4$ (mean $56^{\circ}2$, difference, $10^{\circ}8$). In 1856, the early part of July 8th was warm, but the temperature suddenly changed, and, as a consequence, it was observed that the Swifts became benumbed, flying with unsteady flight, and hanging in clusters two feet in length, and dying by hundreds. Temperature, 48° , or 13° below the mean temperature (61°). And in 1849, a similar phenomenon was observed. On May 10th and 11th, dead Martins and Swallows were found in barns, sheds, and churchyards, in Norfolk. The weather was cold and boisterous, the temperature being $42^{\circ}2$, or $8^{\circ}7$ below the mean of $50^{\circ}9$.

These facts, while they illustrate the dangers to which these tender birds expose themselves when performing the duties of rearing their young in this variable climate, make us the more surprised at finding some of them existing all the winter in certain localities. Thus, in 1850, a male Blackcap was observed in Oxfordshire, on the 1st December, apparently in good health, although the weather was very severe. On November 11th, of the same year, a Blackcap was observed at Melbourne, in Derbyshire. In 1851, a female Blackcap was observed, during the months of January and February, coming for crumbs like a Robin, at Duddingstone, near Edinburgh; and the same species is related to have remained during the whole winter of 1856-7 in sheltered valleys, about Penzance, in full activity. The occurrence of other species in winter is also from time to time recorded.

The numbers of the summer birds of passage undergo very considerable augmentation as the season advances, owing to the bringing up of one or more broods, the individuals of which are undistinguishable from their parents to the ordinary observer. Even the Swifts, which only rear one brood of two young, increase very perceptibly in numbers during the latter part of their stay. This increase, however, is much less in cold seasons than in mild and genial ones ;* for although the young bird, in order to thrive, evidently requires a mild and temperate climate, a continuance of cold weather cannot be otherwise than fatal to vast numbers. It has been observed that Swallows quit their summer quarters earlier when the season has been fine and warm, and such a phenomenon evidently arises from the fact that there has been no drawback to the development of their young broods, and they have therefore sooner completed the purpose for which they come hither, and are the sooner ready to depart.

It is worthy of remark, that our summer birds of passage do not pass through the autumnal moult while they remain with us. Birds which are indigenous to this country, pass through this physiological change long before the departure of the visitors, and so important and constitutional a phenomenon is it, that like the changing of the shell, or ecdysis of crustacea, most other ordinary functions and habits give way to it, and in ordinary parlance, they are said under these circumstances to *sicken*. Probably our indigenous birds, which have to prepare for the severities of our winter, are enabled by a wise provision of nature, to accomplish this change comparatively early in the season, in order that the high physiological excitement which accompanies the production of the new crop of feathers may be assisted and supported by the, as yet scarcely diminished, temperature of August; so

* The paucity of Swallows in the present cold and wet summer cannot fail to have struck many observers.

that when the cool autumnal days and nights arrive, they are amply provided with protective covering. But with birds which are about to depart to warmer latitudes the case is different. On the one hand they do not so exigently require an early change of dress, and on the other it is evident that did they moult in August or September, there would be danger of their not being sufficiently recovered from the semi-morbid condition induced by the change, to enable them to accomplish the serious business of migration in safety. It has indeed been ascertained by naturalists, in this as well as other countries, (says Yarrell) that Swallows moult in January and February.

III. Let us next consider the circumstances connected with the migratory birds quitting this country in Autumn. As they arrive, some considerably in advance of the rest, so some depart earlier, and it would be interesting to discover whether the first comers are among these. I should, for reasons before stated, be disposed to think not. The mass of the birds being very much more numerous than those which arrived in spring, owing to the accumulation of one, two, or even three broods of young, the autumnal retreat is more distinct and marked in its character than the spring arrival, and it is much more easy to observe the departure of the *main body*. The signs and symptoms of coming winter, more apparent in the northern part of our island than in the south, drive the birds constantly southwards, where they are gradually joined by those which have never been far north, and the body swells its numbers as it approaches the south coast. Mr. Couch, observes, moreover, that "the Swallow seems to feel a degree of hesitation in venturing on the passage of the channel, and will keep along the coast for a considerable distance;" thus corroborating the remark of the Rev. John White, at Gibraltar (quoted by his brother Gilbert), that some birds, "particularly

the Swallow kind, are very sparing of their pains in crossing the Mediterranean." The obvious result is that great accumulations of birds, especially of Swallows, are observed in the South-eastern parts of England, which have surprised even ornithologists by their numbers ; and these are more particularly noticeable as they near the coast.

In the latter part of the season (September), these accumulations assemble upon the church-towers, house tops, &c., in the Southern Counties, as was observed as long ago as 1791, by White, who says (Sept. 13th), "when they fly off from the roof, on any alarm, they quite swarm in the air. But they soon settle in heaps, and, preening their feathers, and lifting up their wings to admit the sun, seem highly to enjoy the warm situation. Thus they spend the heat of the day preparing for their emigration, and, as it were, consulting when and where they are to go." Such accumulations, however, sometimes occur further north ; and a very curious example is related in the *Zoologist* for 1855 (p. 4558) by Mr. J. J. Briggs, as occurring in Derbyshire, where they gathered in the latter part of August "in amazing multitudes, for their numbers seemed really sufficient to people every town and hamlet in England." This vast flock increased until the 17th Sept., when they all departed except a few hundreds.

Previous to their final departure, however, they congregate in great numbers at various places upon the coast, such as Dover and Brighton ; and although they are often unnoticed by the ordinary observer, it sometimes happens that some person, such as a coast-guard man, whose duty it is to be on the look-out, has his attention drawn to these congregations. Mr. R. Wakefield remarks, in the *Zoologist*, that the houses in Arundel terrace, Brighton, are covered with Swallows and Martins in September and October ; and careful observers in the Isle of Wight have particularly remarked these vast congregations at this season.

But although their manner of conducting themselves previously to their departure has been so frequently noticed, it does not appear that their actual departure has been observed. Enquiry of the coast-guard men, at Brighton, elicited the fact that they never see them go. They appear on an autumnal afternoon congregating in vast clusters upon the roofs, but when the light of next morning comes they are no longer visible. The inference is, plainly, that they have departed in a body some time during the night, or probably in the very early morning.

This remarkable habit of congregating in such vast numbers, and this simultaneous departure, well illustrate the peculiar characteristics of the autumnal migration, which I have before referred to, as distinguishing it from the vernal one. In the latter, birds are rather impelled by their own individual feelings, and act in a comparatively independent manner, each obeying, as it were, an internal impulse ; while in the former, of which we are now speaking, the feeling is rather a social one ; they act in concert, because they all are bound up in a common cause ; they are flying, not *before* the sun, but *after* it—not with exhilarated sensations towards abodes of enjoyment, but with depressed feelings away from danger. In a word, while the vernal migration is of an *endemic*, the autumnal partakes rather an *epidemic*, character.

The preceding remarks concerning the congregation and departure of the birds apply more particularly to the *hirundines*. These birds are so generally known and such general favorites, and they, moreover, present the phenomena of migration in so characteristic a form, that they have received more attention than any other birds, and more distinct information has been collected concerning their movements.

Nothing is more common, however, than to observe, after the vast majority of the birds have left us, straggling individuals, or even small flocks from time to time, evidently bent

upon following in the footsteps of the main body that has preceded them. Such loiterers are met with far on through October and November. Mr. W. T. Bree remarks that "after the general flight has departed, and not a swallow to be seen, a few will often appear after a considerable interval," and he goes on to observe, that these are "all evidently young birds, tame, and inexperienced, allowing themselves to be taken in the hand." Such late birds were especially noticed in the autumn of 1848.

The migratory instinct indeed may well be considered of remarkable power, since we find that that strong and innate feeling which mammals and birds possess in common, that *στοργή*, or parental affection, which makes a hero of the most timid, is overcome by it.

The Swallow brings out two broods during the summer, and should all things go on favorably, these two broods are fledged in due time, and probably accompany the parent birds in their departure. But should the nest be destroyed, or one of the parents killed, or anything occur to delay the maturity of the young to any considerable extent, so that they are unable to leave the nest, the swallows pitilessly forsake them under the more powerful impulse of migration, and they necessarily perish. Such young birds are not unfrequently found rotting in the nest after the parent birds have quitted the country. Should, however, any of these late young be able to shift for themselves at this epoch, although still not strong enough to accompany their parents, their departure would probably only be delayed for a few weeks until they had gained strength of wing sufficient to enable them to attempt to follow under a similar impulse. And thus, while no sufficient cause could be found to deter the old birds from quitting us at the appointed time, the fact of so many young being observed after the rest were gone, may probably be in this manner explained. It may be remarked that August, 1848, was a

very cold month, though the other summer months were above the average temperature.

Let us now follow the birds, and observe their behaviour during their flight. There are numerous recorded cases of migratory birds being seen *in transitu*, and their mode of crossing the sea has been several times observed. The Rev. John White noticed at Gibraltar that the Swallows "scout and hurry along in little detached parties of six or seven in a company, and sweeping low, just over the surface of the land and water, direct their course to the opposite continent, at the narrowest passage they can find." (Selborne, Letter 42). But if this be so with the Swallow tribe (and the fact is confirmed by Mr. Couch) it is the more remarkable, inasmuch as it is certain that many of the short-winged birds boldly take the sea at considerably wider parts. Thus, Mr. E. H. Rodd informs us that the Redstart, Reed Warbler, Garden Warbler, Lesser Whitethroat, Wood Warbler, Pied Flycatcher, &c., are found in the Scilly Isles during the autumnal migration, and it is still more extraordinary that the *Nightingale* should be found there also, since it, as well as the Pied Flycatcher, has never been either seen or heard in Cornwall. The Scilly Isles, according to Mr. Rodd, "form a sort of resting-place for our migratory birds in the great autumnal movement from north to south." And we do not hear any accounts of large accumulations of these birds in the south-eastern parts of England in autumn, as we do of the Swallows. Hence it would appear, that these short-winged birds do not at all events coast along until they come to the narrowest part of the sea, although the passage itself is naturally performed with the least expenditure of labour; they "are seen to hurry along from one margin of the sea to the other, with no more effort than is absolutely required to enable them to cross in safety;" and again, "seeking close to the shore the most convenient station for departure, they hurry across the sea with the utmost expedition."—(Couch).

A writer in the "Field" (Sept., 1860) states that being in the Mediterranean, half-way between Cerigo and Malta, on the 21st April, large numbers of Titlarks,* with a few Wheatears and Swallows, flew on board the vessel in an exhausted condition; but after a rest of an hour or so, many of them proceeded on their journey, "flying but a few feet, apparently, from the surface of the water." The vessel was 240 miles from Africa on one side, and Italy or the Morea on the other, so that these short-winged birds had ventured on a flight of not less than 480 miles. Flocks of turtle-doves passed the ship the whole day, but though some alighted on the rigging, they shewed no symptoms of exhaustion. On arriving at Malta, he found numbers of Cuckoos had been caught in the Quail nets.

C. L. Bonaparte also, on the 20th March, 1828, being 500 miles from the coast of Portugal, and 400 from that of Africa, observed a few Swallows and Martins, and several small warblers, principally Willow Wrens, among the rigging. The nearest land was Madeira, 200 miles distant.

Mr. Thompson of Belfast (Annals of Natural History, 1st series, vol. 8, p. 125), when travelling from Malta to Candia in April, 1841, remarked daily, Swallows and other birds upon the ship. The birds seen were the Swallow, Martin, Bee Eater, Black-headed Bunting, Chiff-chaff, Ibis, Golden Oriole, Hoopoe, Fern Owl, Quail, Redstart, Turtle-Dove, Wagtail, Wheatear, Whitethroat, Lesser Whitethroat, Willow Wren, Woodchat, and Wryneck. He observes of them, p. 129—"All the birds seen on

* Instances of this bird having been found vastly more distant from land are on record. Stanley (Familiar History of Birds) relates that "a common Titlark (*Alauda pratensis*) alighted on board a vessel from Liverpool, in lat. $47^{\circ} 4'$ S., and long. $43^{\circ} 19'$ W., in Sept., 1825, at a distance of at least 1,300 miles from the nearest mainland of South America, and about 900 from the wild and barren island of Georgia. The poor little traveller was taken, and brought back to Liverpool, when it was seen by Dr. Traill." In connection with this I may remark, that I have searched the minute books of the Literary and Philosophical Society (now in my possession) in vain for any account of this circumstance, which is singular, considering that Dr. Traill was at that time Secretary, and brought so many interesting communications before the Society.

migration bore right on in the course they had come, whether they rested temporarily on the vessel, or otherwise. They all came from a southerly direction, either due south, south-west, or south-east. The wind was moderate, the weather fine and dry during the whole passage, so that all the species we saw were in the ordinary course of migration, and none driven to the ship by any stress of weather."

These illustrations are sufficient to prove that the distances traversed at one flight are very considerable, and although we may not feel much surprised at birds of the power and strength of wing which Swallows possess, attempting a sea passage of several hundred miles, we cannot fail to be struck at the boldness with which the necessity of migration endows our little short-winged birds, which in summer time seem never to fly, except from hedge to hedge. It is truly marvellous to contemplate such birds as the Whitethroat and Willow Wren launching out into a waste of waters, and flying for hundreds of miles, "apparently a few feet above the water," impelled by an instinct which they thus follow, can we say, *blindly*. Audubon and others assert that the Swallows have the power of settling upon the calm water, and there taking a brief rest, but no one pretends that our short-winged birds have ever been seen to do so ; and in any case it seems a hazardous experiment upon a sea tenanted by hungry fish. The powers of endurance of these small birds must be truly extraordinary.

The rapidity of flight, too, differs so much among birds, that its consideration is very unfavourable, *a priori*, to the successful passage of the short-winged birds. The flight of the Swallow has been computed at 90 miles an hour, and that of the Swift has been conjectured to be nearly 180 miles an hour, and these birds appear to be on the wing the whole of a livelong summer's day, without any symptom of fatigue. The strong and rapid flight of the Pigeon tribe, also, is proverbial. An Owl may be seen "gliding over the midst of the Atlantic

Ocean, with as much apparent ease as if it had been seeking for mice amongst its native fields," (Stanley,) or in the Mediterranean, where that sea is 500 miles wide, there might be seen "high over head, flocks of Vultures or Eagles, proceeding as leisurely as rooks of an evening on the way to their roosting-places"—these circumstances appear to us but natural results of the alar endowments of such birds. But no one will pretend that the flight of the Titlark or Redstart bears any comparison with that of its companions in migration, the Swifts or even the Swallows. Nevertheless they appear to perform that migration at least equally with them.

It is not surprising, however, that the short-winged birds should appear fatigued and exhausted in nearly every instance in which they have been observed at great distances from land. Even Swallows are in most cases so described. It appears, nevertheless, that a short rest reinforces their strength, and they are soon able to pursue their journey. Nor, when this is borne in mind, will it seem at all strange that, on arriving at their destined spots in this country, they should (as previously remarked) require a night to recruit themselves.

It may truly be said, however, that the migratory journey is a perilous one for such birds. Doubtless the fatigue and exhaustion above referred to are fatal to numbers. Doubtless vast numbers over-rate their strength under the impulse of migration, and plunge headlong upon a journey which they are unable to accomplish, and in which they must necessarily perish. Of the devoted band that set out on their flight across the pathless, pitiless sea, we may be sure that the victims are not few. For not only are the ordinary dangers of the way ever present, and ever exercising their influence in diminishing the numbers of those that succeed in the attempt to cross, but extraordinary dangers are liable to arise, which must slaughter them by wholesale. I allude to *storms*, which are not infrequent at the time both of spring and autumnal migration.

While a fair wind must assist not a little in bringing a flock across in safety, an adverse wind, even though light, must be fatal to many, if their strength be, as it would appear, nicely adjusted to the work they propose to themselves. A cross wind also would exert a considerable influence in lengthening the journey; and in many cases, when near the sea coast, a strong wind blowing off shore would be very liable to drive the birds hopelessly out to sea; and they have been found in such situations as leave little doubt that they have met with such a mishap. But it is more particularly strong gales and hurricanes, which occur both in spring and in autumn, to which I refer—and these, if they cross the path of the migrating flocks at sea, would probably almost annihilate them. Even sea birds are not proof against such storms; and after a north-east gale in May, 1856, a large number of such birds, viz., Gulls, Razor-bills, Guillemots, and Puffins, were found dead, and collected from the shore of Norfolk in cartloads. The great scarcity of Woodcocks in 1859-60 is attributed by Mr. Saville in the “Zoologist” “to the fact that hundreds of thousands of these birds were drowned during their migration towards these shores on the night of the terrific gale in which the *Royal Charter* was lost.”

Even the beacon which guides the mariner in safety becomes a snare and a destruction to migrating birds, and one of sufficient importance to claim a place among these dangers of the way. The lantern of a lighthouse is to a bird what the candle is to the moth; and although the bird cannot singe its wings in the blazing light, it can, and sometimes does, fly with such violence against the plate-glass protecting it, as to fracture the glass and break its own neck. The men employed in lighthouses are familiar with such collisions. On one occasion, on a wet and somewhat stormy night, between ten and eleven o'clock, the Start lighthouse became the scene of such a self-immolation to a considerable extent. The light-

keeper relates that the birds continued to fly against the lantern, increasing in numbers as it became calmer, until eventually he picked up six hundred and ninety-two dead birds, weighing 34lbs.

IV. Lastly, let us briefly consider our migratory birds as residents of some distant countries, in winter. This part of the subject is, in a great measure, speculative, inasmuch as very little is known of the wintering places of summer migrants. It is true that birds of the same species as those which visit us in the summer, have been observed in winter in the south of Europe, and North and West Coasts of Africa; but the difficulty is to predicate of these birds that they are the same which spent their summer with us; and it may as yet be considered unproven to what precise regions they betake themselves. The most complete information concerning the observed occurrences of the Swallow tribe in winter with which I am acquainted is to found in Yarrell's "British Birds" (ii. 242), "Swallows," he says, "leaving Italy, which they all do in the autumn, go off in the direction of Egypt, and have been seen in Egypt going still further south. Bruce saw the Swallow in Abyssinia in winter. In Napier's *Reminiscences of Syria*, it is stated that Swallows were seen near Esdröelon, on the march to Naplouse, in December and January. * * and Mr. George Don told me he saw the Swallow, the Martin, and the Swift, at the island of St. Thomas, on the equator, in the months of January and February." Adanson, also, in his *Voyage to Senegal*, asserts that he saw Swallows between Goree and Senegal, but, in most of these observations, there is the difficulty that the observers were not *ornithologists*, and there is no guarantee that they did not mistake our European birds for some other nearly allied species.*

* This illustrates one great advantage arising from an acquaintance with the notes of birds. Being always the same in the same species, an ornithologist whose observation may be very imperfect if he trust to his eyes alone, may be certain of his accuracy, if it be confirmed by the ear.

The information, then, that we are in possession of as to where the birds retreat in winter is of the scantiest. I have made diligent enquiries of more than one enterprising traveller, whose peregrinations in distant southern countries led me to hope for some results, but in vain. They have uniformly declared their inability to throw any light upon the subject; and, indeed, unless they be ornithologists, and pay special attention to the subject, it could scarcely be otherwise. Experiments upon a large scale, and made in concert between ornithologists of this country, and those residing in some of our African colonies, or on the shores of the Mediterranean, would be necessary, if satisfactory results are looked for. The physical condition of the birds in their winter quarters, may, however, be judged of by that of those which remain with us.

There is no reason to suppose that the conditions under which our summer migrants live in their winter quarters differ in any material respect from those which govern our indigenous birds that remain. The only difference, in fact, is one of constitution, inherent in the birds; in other words, the migratory birds require the comparatively high temperature simply to keep them in the same state of active life and health as our indigenous birds maintain under the ordinary condition of our winter climate; in fact, it is a mere question of *hardiness*. The birds are doubtless no less in a quiescent state in the warm plains of Africa and Andalusia than they are in the midst of our frost and snow. No breeding operations are performed during the winter by the birds which have flown south, any more than they are by those which remain in the north. Doubtless, food is more plentiful with them than with our residents; they are not liable to be frozen in some Arctic night, nor to find in the morning the supplies cut off by a thick mantle of fresh fallen snow—these mishaps they escape, because their vital energies are not constituted to endure such

hardships, and they would immediately perish under such circumstances. But in other respects—in their ordinary economy and mode of life—they, no doubt, closely resemble their more robust brethren. In our own climate, some indigenous birds congregate during the winter in vast flocks. Such are Larks, Greenfinches, Linnets, Buntings, Starlings, Chaffinches, &c.; and Gilbert White has ingeniously speculated upon the object of this flocking together, and suggests that self-defence and self-interest may be the motive for the proceeding. “Perhaps approximation may dispel some degree of cold; and a crowd may make each individual appear safer from the ravages of birds of prey and other dangers.” (Letter 48.) We have no means of knowing whether migratory birds flock in a similar manner in winter; but it does not appear that there is any reason for their so doing. Whatever may be the object, certain it is that these flocks are the more conspicuous, the more severe is the weather; and, inasmuch as summer migrants place themselves beyond the reach of wintry influences, in this respect, at least, their condition must somewhat differ from that of those which remain.

But there is one circumstance in which it would seem that they agree. Although it is very probable that the apparent separation of the sexes in certain birds in winter is due, in some cases, to a change of plumage, or to the confusion between hen birds and young birds of the year, still, the existence of such a separation under certain circumstances, appears at least very probable. Would not the fact of the cock-birds of the migratory species arriving some days before the hen (if it be a fact) indicate that a similar separation had taken place between them?

Although, however, our summer visitors place themselves by their migrations beyond the influence of many of the most apparent dangers to which our residents are exposed in winter, no doubt they have plenty of enemies, and there are, doubtless,

plenty of sources of diminution of their numbers. Certain it is, that the birds which quit us in autumn vastly exceed in numbers those that return in spring. The winter is a season of mortality, but it is also a season wherein population is at a stand-still. The rapidly diminishing numbers of the birds indicate that it is high time for a restoration, and the demand for a new multiplication and replenishment of the species is the cause, while its supply is the effect, of the normal migratory movement.

POSTSCRIPT.—Since the above paper has been in type, I have met in Audubon's great work, "The Birds of America," with a curious and interesting confirmation of one opinion I have advanced in it. He says, when speaking of the Cliff Swallow (*Hirundo fulva*), "After some years' observation and reflection, I remarked, that among all the species of migratory birds, those that remove farthest from us depart sooner than those which retire only to the confines of the United States; and by a parity of reasoning, those that remain later return earlier in spring." *Birds of America*, (New York, 1841.) Vol. i, p. 179.

NOTE.—It is stated at page 46, that the paper “On the opportunities of advancing science enjoyed by the Mercantile Marine,” was nowhere else printed. While this volume was passing through the press, however, a reprint of it has appeared in the “Zoologist,” for August and September, 1862.—ED.

APPENDIX;

CONTAINING

AN ACCOUNT OF THE PROCEEDINGS

OF THE

Jubilee Festival

OF THE

LITERARY AND PHILOSOPHICAL SOCIETY

OF LIVERPOOL,

MARCH 11th and 13th, 1862.

LIVERPOOL:

T. BRAKELL, PRINTER, COOK STREET.

1862.

AN ACCOUNT OF THE PROCEEDINGS
OF THE
Jubilee Festival
OF THE
LITERARY AND PHILOSOPHICAL SOCIETY.

I.—THE BANQUET.

The time having arrived for celebrating the completion of the fiftieth year of the Society's existence, the proceedings were inaugurated on Tuesday evening, March 11th, when his Worship the Mayor, Robert Hutchison, Esq., entertained about one hundred gentlemen, consisting of the President, Council, and numerous members of the Literary and Philosophical Society, as well as representatives of the other learned societies of this town, at a sumptuous banquet in the large Ball-room of the Town-hall. Amongst the guests were:—

Revs. H. H. Higgins, Dr. Howson, Dr. Hume, Dawson Turner, Christian D. Ginsburg, J. Robberds, T. P. Kirkman, F.R.S., and H. J. Hindley; Lieutenant-Colonels W. Brown, Hurdy, Manners, Thomson, and Turner; Majors Brooks, Tinley, and Hutchinson; Captains L. Hornblower, and Greathead; Drs. Collingwood, Duncan, Dickinson, Edwards, Inman, Ihne, Nevins, and Trench; Messrs. Alderman Bennett, I. Byerley, Swinton Boulton, Joseph Boulton, Baruchson, Dobson, Percy M. Dove, H. Duckworth, Hartnup, W. Lassell, James Newlands, J. A. Picton, P. H. Rathbone, C. E. Rawlins, &c.

The Ball-room presented an unusually brilliant appearance, the walls being hung with a fine collection of oil paintings, contributed from the galleries of numerous connoisseurs in the neighbourhood.

After the cloth had been withdrawn,

The MAYOR gave the toasts of "The Queen," "Prince of Wales," and "Royal Family," which were cordially honoured.

The toast of the "Bishop and Clergy of the Diocese," having been proposed by the Mayor, was responded to in appropriate terms, by the Rev. J. S. Howson, D.D.

The next toast was the "Army, Navy, and Volunteers," acknowledged by Colonel Turner and Colonel W. Brown.

The Worshipful the Mayor, then announced that he was about to propose the principal toast of the evening—"THE LITERARY AND PHILOSOPHICAL SOCIETY," a Society which had been intimately identified with Liverpool, since the period when Liverpool began to make those strides in commercial development, within the present century, which had astonished us all. And more particularly at the present time did it seem to start into fresh vigour, at a time when Liverpool itself was taking a fresh start in commercial life, and was certainly advancing at a pace which was far beyond anything that could be said of any town or city in this gigantic empire. The Literary and Philosophical Society was the oldest learned Society in the town, and took its rise fifty years ago; with it were identified the names of many of those gentlemen who had been most conspicuous in the history of Liverpool for their commercial enterprise, as well as for their literary and philosophical pursuits, gentlemen who had done all that could be done to keep alive in the town a taste for literature, and the study of philosophy. When he named Roscoe, Currie, Bostock, Shepherd, and many others, he knew he was pointing to men who had been conspicuous in their day,—men who had been deserving of the warmest thanks of the community in which they lived, and to whom we have, in turn, succeeded. In connection with this toast, he gave them the name of the estimable President of the Society, the Rev. H. H. Higgins (cheers).

The Rev. Henry H. Higgins, M.A. (who sat on the Mayor's right hand) then rose and said—Mr. Mayor, it is indeed a gratifying and (as I think) a very significant fact, that you, sir, as the representative man of the whole population of Liverpool, have been pleased on this occasion to do honour to many of the local operatives in literature, science, and the arts, to the societies established for their encouragement, and especially to the Literary and Philosophical Society, rendered prominent by its seniority, and by the occurrence of its fiftieth anniversary. I cannot count the years, but they have been many, since the chair you occupy was first filled by a Mayor of Liverpool; but I believe this is the very first occasion on which a literary society of Liverpool has, in the person of its officers, of its whole council, and of many of its active members, been thus assembled and thus honoured at the civic board. What shall I say in return? It is quite unnecessary to speak of the advantages accruing to the commerce of Liverpool from the cultivation of literature and science (hear, hear). As to literature, I believe it is pretty generally admitted, even by those who are a little jealous, that there is a freedom of address—a gentlemanly bearing, which distinguishes many of the merchants of Liverpool, and which is the recognised result of an appreciation of literature and the fine arts (hear). And as to science, the working transactions of a day, or of a year, in Liverpool are composed of little else than the practical applications of scientific truths. But it is much more needful to ask what are the advantages conferred on philosophy (I use the term in the broadest sense), by close contact with the absorbing occupations, the indispensable activities, of a mart like this, where the energies of every one are taxed to the uttermost, and where, certainly if anywhere in the wide world, it might seem incongruous to use the phrase, "*Deus nobis hæc otia fecit.*" At first sight, it may seem that a very short answer will suffice to a question such as this.

Philosophy here *may* struggle against difficulties—*may* win a passing recognition, but can never hope to establish a claim to allegiance; there is an utter absence of the retirement and the leisure supposed to be required in the service of philosophy. But is it, sir, a fact that the men who have done best service in this cause have been otherwise unoccupied? Bacon was Solicitor-General, afterwards Attorney-General; Newton was a member of Parliament and Master of the Mint; Locke was a Commissioner of Trade; Humboldt a traveller over the whole world; Linnæus a professor of medicine; and the list might be indefinitely extended (hear, hear). A man need not, therefore, be a worse philosopher because he has other active occupations (applause); and the converse of this is strictly true, that a man may not be less trustworthy in his profession because he has a taste for philosophical pursuits. A physician may be not the less worthy of eminence because he is a geologist or a botanist, and, sir, I hope it will be admitted that a merchant's paper on 'change is not damaged by his giving papers to a learned society (laughter and applause). But something more than this is true, and I am prepared to say that advantages of a very peculiar and definite kind are gained to philosophy when literary or scientific subjects are handled by competent men of active habits in business. Such men are able to seize upon points of interest, the prominence of which may be quite undetected by those who are buried in the results of their own researches. How often has the world seen the sad spectacle of men, profound in erudition, wasting their time and energies upon mere nutshells of differences! (hear, hear.) Like the fly on the dome of St. Paul's, their view is so microscopic that the outline is lost. What should we say of two miners disputing upon the proportions of the constituents of quartz, whilst the nuggets lay in their claim unheeded? We should not say that the chemistry of mineralogy was of little importance, but only that there was some-

thing more important to be done at that particular time. But, sir, for this controversy 'twixt tweedledum and tweedledee there is a grand corrective in the contact with men of business ; it is more and more becoming a thing of the past ; the evil is waning before the light of practical, intelligent common sense. Again, such men bring to bear upon questions proposed by the *literati* faculties trained in a different school. No truth can be wholly discovered from a single point of view (hear, hear). The virtue contained in a fact is not exhausted when the fact is anatomised to the last fibre—it requires to be seen as a whole, and in its relations to all other facts. I suppose it will be granted that our great lexicographer knew the value of English words, yet how little of the meaning of Shakspeare's glorious words was exhausted when the learned philologist had told us all he could about them. We needed the lawyer to tell us that Shakspeare must have been a lawyer, and the mariner to tell us that Shakspeare must have lived on the sea, and the psychologist and the naturalist, and lastly the German, to tell us that if Shakspeare was not actually a German, he must have lived in Germany (laughter). I have often in our Society been delighted to witness the graceful turn given by a scholar to an angular fact in science, and the vivid illustration of a classical quotation given by a naturalist, and the practical bearing of the whole contributed by a man of business. Again, such men form that discriminating class of the community which is as essential to the progress of philosophy as the attainments of the foremost leader. Beethoven never could have written his symphonies if his audiences had been uninstructed or unsympathetic. I doubt if any traveller would to this day have climbed Mont Blanc if none before him had extolled the difficulties of the Alpine heights. The base of the pyramid is as necessary to its height as the apex itself. And lastly, such men are the fairest representatives of that great ocean of mind which, in the

thousands of our fellow-creatures, hopes, and fears, and reflects, and loves, and grieves, and appears and disappears,—to reach and to instruct, and to improve, and to fortify, and to cheer which, is the greatest object of philosophy (applause). Heaven forbid that it should ever again be the cry—"Philosophy for the Philosophers." Daniel was by far the most religious man of the old Testament, and he had all the affairs of Babylon on his hands; and just as the very highest external test of the Divine origin of our faith consists in this, that it is not, as all forms of superstition are, adapted to the devotee—that it grants no special privileges to the recluse—that its highest exercise and its highest promises are to be sought in the paths of active life, and in the fulfilment of our relations towards our kind and towards our Maker; so it is of true science, which is from the same origin, and will stand, I believe, the same test (applause). Mr. Mayor, in the name of the "LITERARY AND PHILOSOPHICAL SOCIETY," I beg to thank you for the honours of this occasion. The prize of being permitted to express our feelings in this great art and science union has been drawn by me; and it is augmented by the munificent manner in which you have illustrated the maxim, that if one member be honoured, all the members rejoice with it (loud cheers).

The MAYOR said, that although the Literary and Philosophical Society was the oldest learned Society in the town, he must not forget that he was honoured this evening by the representatives of many other scientific institutions (hear, hear). Architecture, archæology, polytechny, and the fine arts were assembled round the table, and he asked them to join in drinking to the "Scientific Institutions of Liverpool," coupling with the toast the name of the Rev. Dr. Hume.

The Rev. Dr. HUME said there were few towns in this kingdom in which science should be received with so warm a welcome, or where it should find so comfortable a home, as in

Liverpool, because few towns had been laid under a deeper weight of obligation to it. It was science guiding the hand of skilled labour which reared those gigantic moles, and dug those inland basins which constitute the glory of our town. It had, too, improved the construction of our ships; it had found for them a new means of propulsion; it had marked their respective tracks over the ocean; it had provided facilities for loading and unloading, for embarking and disembarking; it had regulated time, and had enabled distant nations to hold easy converse with each other. It thus exhibited nature's laws, increased human conveniences and comforts, and promoted peace and goodwill among men. Our whole country was commercial, but Liverpool was especially so; our country was colonising, and Liverpool was the great port for emigration. The speaker then referred to the progress made by science in Liverpool, and enumerated the various societies of the town, briefly alluding to the characteristics of each; and, with reference to the Royal Institution, said it had given free accommodation to the Literary and Philosophical Society, and had truly acted as a nursing mother (hear, hear). The Town Council had, in like manner, become a nursing mother to other societies, and had afforded similar privileges; and all honour to them for their kindness, courtesy, and appreciation of what was right. There was another circumstance to which allusion ought to be made on the present occasion. They had recently inaugurated the Free Library and Museum. One gentleman had given the casket, and the public had supplied the jewels which it contained. Difficulties had arisen within the last few months with respect to that institution, but he believed those difficulties would soon be overcome. He could not believe that the infant cradled with so much cordiality and generosity, whose birth was celebrated with so much earnestness, and whose baptism was so cordially approved of, could be permitted to pine from atrophy

or to languish for want of sufficient nourishment. Liverpool was quadrupling its population and importance in every fifty years; and it would not do for our institutions to make progress incommensurate with the increase of the town.

The Mayor next proposed "The Town Council of Liverpool," coupling with it the name of Mr. Councillor Picton.

Mr. J. A. PICTON, F.S.A., begged to tender the thanks of the Council for their kindness in drinking the health of that much-abused body, for they were so much more used to receiving kicks than halfpence that they had begun to be thankful for very small mercies, and that token of their approbation fell like water on a thirsty soul, and was the more grateful accordingly. The connection of the Town Council with art and science was not of very long duration. It was not many years since a gentleman of this town, now living, said that he believed if the Elgin marbles had fallen into the possession of the Town Council the use they would have made of them would have been to break them up to macadamise the roads (laughter). That observation afforded an example of the reputation the Town Council had obtained for their want of appreciation of literature, art, and science; but the times since then had somewhat mended. They were celebrating that evening the Jubilee of a Literary and Philosophical Society, and if the ghosts of the gentlemen who surrounded that table fifty years ago could appear before them they would be very much astonished to see the Mayor entertaining such a body. In that respect there had been a change for the better, and he thought that the gentleman to whom he had alluded, if he could have been present that evening, would admit that his prediction would scarcely have been realised. The Town Council claimed no credit for taking the position they had taken in reference to the Public Library and Museum, for they were merely the organs of public opinion. He believed that he might say with pride and pleasure that, backed as they had been by the liberality

of his hon. friend on the left (Colonel Brown), and the munificence of Lord Derby in presenting the Museum of his late father, Liverpool had now a Library and Museum worthy to rank with those of any other provincial town. The Institution had been sailing through troubled waters, but he hoped it would weather the storm, and come out with sails but slightly rent, and its rigging but little crippled. All depended on public opinion. If the public felt that the Library and Museum, the Botanic Gardens, and similar places were things of no value—were not worth slight sacrifices in order to maintain them in their integrity—let them perish. But, on the other hand, if the public feeling were such that they ought to be supported, the pressure from without, whatever the feeling of the Town Council might be, would render it impossible to resist preserving those institutions in their full usefulness. He merely dropped the hint as showing the effect of public opinion on municipal institutions. Far be it from him to despise municipal institutions, for he held that not only literature, art, and science, but everything that tended to the improvement of humanity were indebted to such institutions. If they wished to test the feeling of the Town Council of Liverpool, they could not do it better than by referring to the choice it had made in its chief magistrates. When he thought, without going back many years, of those who had filled the civic chair of this town, such men as Mr. Samuel Holme, Mr. T. D. Anderson, Mr. S. R. Graves, and last, though not least, Mr. Robert Hutchison (applause), he did not think very meanly of the intelligence, self-respect, and public spirit of the Council (hear, hear). He would say no more. He thanked them all cordially for the manner in which they had received the toast, and he hoped that the successors of the present Town Council might not only equal, but surpass them in public spirit, and worthily conduct the affairs of the town for the time to come (loud applause).

The Rev. H. H. HIGGINS said he had the honour to propose the health of his Worship the Mayor (loud cheers). His own friendship for the Mayor had been of long duration, and he could with truth say the longer he had known his Worship the more good qualities he had discovered in him; and he was sure that, in all the sagacious selections by the Town Council they had never indicated more sagacity than when they placed Mr. Robert Hutchison in the chair (hear, hear). Allow him, then, to propose the health of their excellent and most esteemed host—the Mayor (loud and continued applause).

The MAYOR, in responding, said he begged to tender to them all his warmest thanks for the very kind and cordial welcome they had given him, and to Mr. Higgins for the very flattering manner in which he had been pleased to bring his name forward. If any expectations had been raised as to the manner in which he should discharge the duties of the high office to which he had been appointed, he could only hope that he should not disappoint them (applause).

The Mayor gave “The Town and Trade of Liverpool.”

Mr. SWINTON BOULT returned thanks.

The Mayor next proposed the health of his Vice-Presidents, Mr. Alderman Bennett, Dr. Collingwood, and Dr. Trench, to which the first-named gentleman responded.

The toast of the “Press” was then given by the Mayor, who coupled with it the name of Mr. M. J. Whitty (loud applause).

Mr. M. J. Whitty and Mr. R. H. Sherlock responded.

The Mayor said, the toast last but not least on the list was “The Lancashire Witches,” and he was sure his friend Mr. Henry Duckworth would do it full justice (applause).

Mr. HENRY DUCKWORTH said—Mr. Mayor, I respond to this toast with the greatest pleasure, for it gives me a rare opportunity of expressing my devotion to the fair sex. As

this is a gathering of *savants*, I shall not take upon myself to respond for the Lancashire Witches in general, but for that particular section which is devoted to the study of science. I am aware that the world mockingly calls these *blue-stockings*, and foolishly associates them with absence of crinoline, poke-bonnets, spectacles, and that sort of thing. As far as Liverpool, at any rate, is concerned, I can assure the world that it is very much mistaken ; and if substantial proof of the assertion be wanted, I feel I cannot do better than point, for instance, to the ladies connected with the Naturalists' Field Club. I assure you, Mr. Mayor (and many here present will bear me out in what I say), a fairer, happier, wittier, set of ladies is not to be found in all England than that which assembles from time to time at the meetings of this club. Their healthy pursuit brings roses to their cheeks, coral to their lips, and brilliancy to their eyes,—gives them good tempers, sound constitutions, clear heads, and kind hearts,—in short, renders them the fittest objects of every sensible man's affections. I rejoice, Mr. Mayor, that you are to be present at the *soirée* of the Literary and Philosophical Society on Thursday. You will then have an opportunity of judging of the truth of my statement.

His Worship the Mayor then rose.

II. THE SOIREE.

On Thursday evening, March 13th (the anniversary of the constitution of the Society), a public Soirée was held, by the kind permission of the Mayor, in the Town-hall Rooms. This noble suite of apartments was admirably adapted for the purpose, and twelve hundred and fifty persons found accommodation throughout the evening. For some days prior to the event, the anxiety to obtain tickets of admission was such as has rarely been witnessed upon similar occasions, and it ultimately became necessary to refuse numerous applications.

The doors of the Town-hall were opened at eight o'clock, when the reception began, and the company continued to arrive in an uninterrupted stream until nearly ten, the entire length of Dale-street being at one time occupied with the carriages setting down. The visitors included a large number of gentlemen of influence connected with the town and neighbourhood ; also members of local bodies connected with science and art, besides clergymen of various denominations.*

The company, as they arrived, were announced and received

* The following gentlemen (with their ladies) received special invitations to the Soirée from the Council, and the greater number were present:—

The Worshipful the Mayor of Liverpool.

The Chairman, Deputy-Chairman, and Members of the Library and Museum Committee of the Town Council.

The Presidents, Treasurers, and Secretaries of the following learned Societies :

The Royal Institution.

The Liverpool Academy.

The Society of Fine Arts.

The Philomathic Society.

The Historic Society of Lancashire and Cheshire.

The Architectural and Archæological Society.

The Polytechnic Society.

The School of Science.

The Chatham Society.

The Chemists' Association.

The Geological Society, and

The Literary and Philosophical Society of Manchester.

The Principals of the Collegiate Institution, Royal Institution, and Liverpool Institute Schools.

The President of the Liverpool Institute.

The Dean and Vice-Dean of Queen's College.

The Registrar of the Royal Infirmary School of Medicine.

The Captains of H.M.SS. "Majestic," and "Hastings."

in the Reception-room, at the head of the stair-case, by the President, supported by the Vice-Presidents, Treasurer, and Secretary, with their ladies. A choice collection of shrubs and plants on the landings agreeably relieved the richness of the ornamentation; while the band of Colonel Brown's artillery corps, which occupied the vestibule, at the foot of the stair-case, contributed greatly to the animation of the scene.

The chief attraction of the brilliantly lighted apartments was a very choice collection of pictures and drawings, most liberally contributed by a number of gentlemen in the neighbourhood, well known for their patronage of Art.† They were

The Captain and Head-Master of the School-frigate "Conway."

The Colonel Commandant (Sir J. Jones), the Commanding Officer of the Pensioners (Major Faulkner), and Major Bousfield.

The Bishop of the Diocese, and the Rector and Archdeacon of Liverpool.

The Revs. Dr. M'Neile, Dr. Raffles, H. Stowell Brown, J. H. Thom, and James Nugent.

The Recorder, Judge of the County Court, Stipendiary Magistrate, Bankruptcy Commissioner, Head Constable, Town Clerk, Coroner, Assessor of the Court of Passage, Borough Engineer, and Medical officer of Health.

The Chairmen of the Dock Board, and Chamber of Commerce.

The Members of Parliament for the County and Borough, and the Member for Birkenhead.

The Collector of Customs.

The Director of the Observatory.

The Consuls for America, France, Prussia, Russia, Austria, and Bavaria.

The Senior Physicians and Senior Surgeons to the Royal Infirmary, and the Northern and Southern Hospitals.

The Editors of the *Daily Post*, *Mercury*, *Courier*, *Albion*, and *Mail*.

The Librarian of the Athenæum.

The Curators of the Free Public Library, Derby Museum, and Botanic Gardens.

Messrs. W. Fairbairn, F.R.S., P. Rylands, Rev. T. P. Kirkman, F.R.S., and Right Rev. the Bishop of Honolulu (Honorary Members).

John Andrews, Esq., of Rivington Hall (Original Member).

† The names of the gentlemen who thus freely lent from their valuable collections, are :—

George Arkle, Esq.
Arnold Baruchson, Esq.
Abel Boadle, Esq.
Joseph Boulton, Esq.
Ralph Brocklebank, Esq.
W. L. Clare, Esq.
F. Chapple, Esq.
J. B. Cooper, Esq.
S. R. Graves, Esq.
H. Gardner, Esq.
Alfred Graham, Esq.
R. Holt, Esq.
W. Horner, Esq.

Frank Howard, Esq.
Charles Langton, Esq.
J. G. Livingston, Esq.
Walter F. Macgregor, Esq.
G. J. Morris, Esq.
L. B. Mozley, Esq.
J. MacDiarmid, Esq.
Thos. Robinson, Esq.
J. J. Ridley, Esq.
James Smith, Esq.
R. Stead, Esq.
E. Storrs, Esq.
Henry Tate, Esq.

disposed as follows :—The walls of the spacious Ball-room were completely covered with oil-paintings (with some unmounted water-colour drawings), by Creswick, Branwhite, Douglas, O'Neill, J. R. Herbert, Faed, Windus, Lauder, Fielding, Cooper, Leu, Phillips, &c. The smaller Ball-room was hung with a magnificent selection of mounted water-colour drawings, the works of the following artists being conspicuous, viz., Copley Fielding, Richardson, Rowbottom, David Cox, Goodall, Carl Haag, W. Hunt, Birkett Foster, Duncan, W. Collingwood, Topham, Maclise, Ross, &c. Seldom has a more varied and beautiful selection of works of art been collected in one exhibition.

The Ball-rooms were further ornamented with tables containing valuable selections of statuettes, bronzes, mediæval works of art, and other objects of vertu, liberally contributed from the establishments of Mr. W. H. Tooke, and Messrs. Elkington, while Mr. Joseph Mayer, F.S.A., exhibited a large cabinet of rare and costly engraved gems, rings, &c., carefully arranged and classified.

The right hand Reception-room was occupied with microscopic and philosophical apparatus. The microscopes, under the direction of Mr. H. S. Evans, were kindly contributed by the members of the Liverpool Natural History and Microscopic Society, and of the Microscopic Club ; they were arranged as follows :—

| | |
|--------------------------------|---|
| Diatomaceæ | Messrs. Geo. Mansfield Browne, and Auguste Overbeck. |
| Rotation in Plants..... | Mr. Salt. |
| Fructification of Ferns | Mr. J. Henderson, Jun. |
| Animal and Vegetable Fibres | Mr. H. S. Evans. |
| Hairs and Bony Structures ... | Mr. T. Sansom, A.L.S. |
| Circulation in Animals | Mr. J. Abraham, and J. M. Shain, M.D. |
| Insect Anatomy | Mr. W. J. Baker, Jun. |
| Anatomical Injections | Mr. C. J. English. |
| Foraminifera | Mr. W. H. Weightman. |
| Marine Life | Mr. T. J. Moore, Corr. Mem. Z. S. |
| Ciliary Action | Mr. I. Byerley, F.L.S. |
| Crystalization of Salts | Messrs. John Newton, M.R.C.S., and W. Allen. |
| Minerals | Mr. N. Mercer, F.C.S. |
| Polarization of Minerals | Mr. Geo. Williams. |

Dr. EDWARDS, by means of a dark chamber, exhibited some very beautiful effects of electrical currents in vacuo, and through gaseous media; the apparatus used being a powerful Ruhmkorff induction coil.

Messrs. G. S. WOOD and W. CHADBURN superintended some interesting optical instruments, stereoscopes, &c.

In one corner of this room, the electric telegraph apparatus (Morse's patent) was introduced by the United Kingdom Electric Telegraph Company. The wires were in connexion with London and Manchester, and messages were freely interchanged between those places and Liverpool, communication being obtained by printing in cypher.

In an ante-room down stairs, Moule's Patent Photogen Apparatus, for taking portraits at night, was in action during part of the evening, and successfully fixed the portraits of several of the guests.

The left hand Reception-room was devoted to treasures of literature and art, under the superintendence of the Rev. Christian D. Ginsburg. Here were antique books and manuscripts, valuable autographs, and rare engravings, including a series of illustrations from the earliest schools down to the present time, selected from the collections of the Rev. C. D. Ginsburg and Mr. P. M. Dove. The former gentleman also contributed some curious and all but unique old bibles, some bearing date 1460, and a collection of original letters of the times, and bearing upon the writings, of Junius. The original MS. of Roscoe's "Life of Leo X" was also exhibited, and some magnificent illustrated works from the Public Library. This room also contained choice collections of photographs sent by Messrs. J. B. Cros and H. Greenwood.

The orchestra in the large Ball-room was occupied by Streather's Philharmonic Band, who played a selection of instrumental music during the evening. This was relieved by some excellent choral singing by the members of the German

Liederkranz, under the direction of Mr. Weingärtner, who most kindly gave their valuable services, and who contributed very largely to the agreeable nature of the entertainment. The following programme of music was adhered to :—

PROGRAMME.

PART I.

- 1.—OVERTURE..... "Lac des Fées."*Auber.*
- 2.—SELECTION..... "Il Trovatore."*Verdi.*
- 3.—SONG (Transcribed for Orchestra)..... "Stella."*Arditi.*
- 4.—SOLO..... Cornet à Pistons, Mr. G. A. W. PHILIPS.....*Storch.*
- 5.—SHADOW SONG..... From "Dinorah."*Meyerbeer.*
- 6.—SELECTION..... "Lucia di Lammermoor."*Donizetti.*

PART II.

- 1.—FOUR-PART SONG "The Dew is on the Rose."*Merker.*
- 2.—FOUR-PART SONG "Oh, My Pretty Girl."*Otto.*
- 3.—OVERTURE..... "Figaro."*Mozart.*
- 4.—TENOR SOLO SONG..... "Evening Song."*Blumenthal.*
- 5.—FOUR-PART SONG..... "Parting and Returning."*Silcher.*
- 6.—L'INVITATION `A LA VALSE.. (Transcribed for Orchestra)..*Weber.*
- 7.—FOUR-PART SONG.... "The Soldier's Marching Air."*Becker.*
- 8.—OVERTURE..... "Fra Diavolo."*Anber.*
- 9.—FOUR-PART SONG..... "The Soldier's Death."*Silcher.*
- 10.—TENOR SOLO SONG..... "Laura."*Rastrelli.*
- 11.—FOUR-PART SONG.. "Mandarin March, with Chinese Text" ..*Otto.*
- 12.—MARCH..... "Eroica."*Gollmick.*
- 13.—REMINISCENCE..... From "Lurline."*Wallace.*

An elegant supper was provided in the Dining-room, and also in the Council chamber down stairs, the use of which was kindly granted by the Mayor, on this occasion. These rooms were thrown open at an early hour in the evening, so that the pressure upon the other apartments was considerably relieved by a free circulation of the guests.

In the interval between the two parts of the concert, the President took the chair* in the middle Reception-room, and delivered the following *Retrospective Address* to the company there assembled.

* The chair used was elaborately carved in oak, and made from the timber of the ill-fated "Royal Charter." It was presented by the owners and underwriters of that vessel to Mrs. Scoresby, in memory of her late husband, the Rev. Wm. Scoresby, D.D., F.R.S., formerly an active member of the Literary and Philosophical Society, who, at an advanced period of his life, made a voyage to Australia in that ship, for purposes of a purely scientific nature.

III. THE PRESIDENT'S ADDRESS,

*Delivered at the Soirée held in the Town Hall, March 13th, 1862, by the REV. HENRY H. HIGGINS, M.A.**

LADIES AND GENTLEMEN,

The Council of the Literary and Philosophical Society of Liverpool have requested me to prepare an Address for the present occasion, and I have done so the more readily, because it seemed plain that the only course proper for me to take in compliance with their request, was one which needed a report of the exertions and productions of others, rather than the expression of any views of my own.

The festival of our fiftieth anniversary claims a retrospective survey of the efforts which contributed to place our Society, during its early history, in the honorable position it has now for half a century maintained; especially since these efforts are associated with the names of some now living, of others who have passed away; all of whom are respected by us,—much for their aid to our Society, more for their characters as men of intellect and social eminence.

The object of our Society from the first has been the promotion of Literature and Science, principally by meetings, at which verbal and written communications are received and discussed, and specimens are exhibited. Fifty years ago few similar societies were in existence. In London a Literary Society, chiefly archæological in its pursuits, was originated by Archbishop Parker in 1572; but the times were not then favorable to philosophical associations, and although

* Much of the information to be found in the succeeding pages, and much more that my limits have compelled me to omit, has been given me by my esteemed friend W. ROSCOE JONES, Librarian of the Athenæum.
H. H. H.

the character of the age for research was vindicated by such names as Camden, Dugdale and Cotton, the Society commenced by Parker was unable to meet regularly till 1707, nor did it receive its charter till 1751, when George II named it the "Society of Antiquaries of London."

The Royal Society of London, for improving Natural knowledge, was incorporated by royal charter in 1662, and as at present constituted is said to be the oldest Society of the kind in Europe, except one at Rome.

The Linnæan Society, for the cultivation of natural history in all its branches, and more especially of the natural history of Great Britain and Ireland, was founded in 1788, and incorporated in 1802.

The Horticultural Society, established in 1804, and the Geological Society, instituted in 1807, complete the list of the five kindred metropolitan societies which bear a date earlier than 1812. Perhaps, however, we should include the Society of Arts, founded in 1753.

To this enumeration may be added seven societies in Edinburgh and one in Dublin, but as these may justly be considered metropolitan associations, national in their character, and fostered by grants from Government, it may be sufficient thus briefly to recognise their seniority, and to pass on to societies claiming to be included in the same category with our own.

Of all provincial societies the Literary and Philosophical Society of Manchester claims precedence; it was founded in 1781, and cherishes the remembrance of Dalton, as we enshrine the fame of Roscoe. The Literary and Antiquarian Society of Perth was founded in 1784. The Literary Society of Belfast in 1801. The Philosophical Society of Glasgow in 1802. The Plymouth Institution and our own

Society together look back to the year 1812. The Literary and Philosophical Society of Liverpool may therefore claim to be regarded, in the United Kingdom as the fourth, in England as the second, in seniority.*

At the time when our Society was founded, not many efforts of a public character had been made in Liverpool for the encouragement of science. Yet we must not, therefore, infer that the earlier worthies of our town were deficient in their regard for sound learning and philosophy. The name of Horrox is too well known in connexion with his favorite science to require more than a passing notice. Bryan Blundell, founder of the Blue Coat Hospital, claims our respect in sympathy with the many who from that institution have risen to acquire in their several callings the highest honor. He died in 1756. Edward Rushton seems to have been equally remarkable for generosity of character and the love of literature; having, through his devoted efforts in behalf of sufferers by ophthalmia, entirely lost his own powers of vision, he became the first projector and promoter of the Liverpool School for the Blind. In connexion with his name we learn incidentally of a Literary and Philosophical Society existing in Liverpool in the year 1790.

The Perrys, father and son, were amongst the earliest known advocates of natural science in Liverpool; the father gave much attention to mineralogy, the son published a work in folio on conchology. The art of decorating porcelain with impressions taken from copper plates was discovered by William Sadler, a native of Liverpool, in 1752. An improvement of the highest importance in the mechanism of watches was first discovered by Peter Litherland, also a native of Liverpool, in the last century.

* Dr. A. Hume on Learned Societies, a work to which I am much indebted for information on this portion of my subject.

The earliest mention of any effort to promote in Liverpool the interests of literature, may be found in the records of a small library, principally of books on divinity, formerly open to the public, but now used only by the clergy. This library was founded by John Fells, a mariner, in 1715.

About the year 1750 commenced a club for reading and conversation. The members first agreed to take in the Monthly Review; growing more confident, they purchased other publications, appointed a librarian, and thus originated the Liverpool Library, now at the Lyceum.

To this we have a contrast in the history of the Athenæum, which like its tutelary divinity, made a first appearance fully equipped. We must attribute to the influence of the distinguished men who were its most active founders the fact, that the shares in this institution within two years of its commencement were eagerly sought after at thrice their original value. "The Athenæum was opened in 1799, and was the first institution of the kind in the kingdom."*

The early progress of art associations in Liverpool was impeded by many difficulties. Nevertheless in 1769, a society was formed for the protection and encouragement of the art of design. The first provincial public exhibition of pictures was provided by this society, and was opened in Liverpool in the year 1774. Our principal native artists in the eighteenth century were George Stubbs, whose studies of animals are still in high repute, and John Deare, a sculptor of acknowledged excellence.

From a sketch, even so brief and imperfect as the foregoing one, of the antecedents of the Literary and Philosophical Society, it may be a matter of surprise to some that a similar combination had not

* "Liverpool," by Henry Smithers, 1825: a work of which I have freely availed myself.

earlier been effected in Liverpool. But at the commencement of the present century there was nothing like an approximation to the diffused philosophy of the current age. Solitary stars shone conspicuously, but the firmament of science did not then as now disclose a multitude of genuine, though secondary auxiliaries to its brightness.

In those days arguments were urged, precautions were suggested, inducements were held out, in behalf of philosophical associations, all of which would now be thought quite superfluous. But it was thus that the work was done for us, and if the early records of our Society are not entirely free from a modicum of quaint simplicity, it is for us to approach them with high respect, bethinking ourselves that our present advantages are very mainly ancestral.

On the Twenty-first of February, 1812, a Meeting was held for the purpose of considering the expediency of forming a Literary and Philosophical Society. The following gentlemen were present—

| | |
|---------------------|-----------------------|
| Rev. T. Houlbrooke, | Mr. Thomas Lace, |
| Rev. Joseph Smith, | „ Adam Hodgson, |
| Dr. Vose, | „ Hancox, |
| Dr. Bostock, | „ David Hodgson, |
| Mr. Thomas Binns, | „ William Rathbone, |
| „ T. Sandars, | „ Richard Rathbone, |
| „ Matthew Miller, | „ William Wainwright, |
| „ James Gilfillan, | Dr. Traill. |

On the occasion of the first enrolment, the following gentlemen subscribed their names, March 13th, 1812, as members of the Literary and Philosophical Society—

| | |
|-----------------|-------------------------|
| John Andrews, | Joseph P. Brandreth, |
| John Bostock, | Robert Benson, |
| William Briggs, | Robert Bickersteth, |
| Thomas Binns, | William Wallace Currie, |
| Henry Booth, | James Cropper, |

William Corrie,
 Willis Earle, Jun.,
 Thomas Fletcher,
 William Grant Forsyth,
 William Flounders,
 James Gilfillan,
 David Gladstone,
 James S. Hancox,
 Joseph Hancox,
 Walter Hamilton,
 Francis Haywood, Jun.,
 Joseph Harris,
 James Hamer,
 David Hodgson,
 Adam Hodgson,
 Theophilus Houlbrooke,
 Lewis T. Jardine,
 John Theodore Koster,
 Robert Kinder,
 Henry Kinder,
 Thomas Lace,
 George Littledale,
 Thomas Martin,

Matthew Miller,
 William March,
 Stanley Percival,
 Samuel Parkes,
 William Rathbone,
 Richard Rathbone,
 Samuel Reid,
 Fletcher Raincock,
 Joseph Smith,
 Edward Rogers,
 Joseph Sandars,
 James Smith,
 James H. Smith,
 William Shepherd,
 Thomas Thornely,
 Thomas Stewart Traill,
 James Vose,
 George Walker,
 William Wainwright,
 George Warne,
 John Yates,
 Joseph Brooks Yates,
 John Ashton Yates,

In the same year, 1812, Mr. Thomas Winstanley offered the use of his Gothic Room for the meetings of the Society. His offer was accepted, but more suitable accommodation was from time to time sought for, till, in 1817, an institution was formed, having for its object "to perpetuate, in the town of Liverpool, an establishment for continuing and extending the acquisitions of early years to the subsequent periods of life, and forming that character of intellectual and moral improvement, without which, successful industry is only labour misapplied, and riches are of no real use to their possessor."

To the originators of a design so much in accordance with their own, the founders of our Society

naturally looked for encouragement and support : it was generously and effectually given, and now for forty-five years the Literary and Philosophical Society has found sympathy and a home in the Royal Institution, which, in its schools, its treasures of art and of science, and in many of the names in its proprietary list, might reflect honour upon any provincial town in Europe. The obligation conferred by the provision of so suitable a place of meeting, was gracefully acknowledged by our Society, by the purchase and presentation of a valuable collection of minerals, now in the museum of the Royal Institution.

At the formation of the Society, the Members unanimously elected, as its first President, the Rev. Theophilus Houlbrooke. The rule at that time was, that the President should continue in office during the pleasure of the Society, or until he chose to resign.

Mr. Houlbrooke himself in 1813 moved the revision of this law and tendered his resignation, but the motion was negatived, and he was unanimously requested to continue in office. On his removal to London in 1814, Mr. Houlbrooke resigned, and was again elected, the Society having been informed that he would be in Liverpool during a portion of the winter. During his residence here Mr. Houlbrooke was engaged in tuition in the family of Mr. Rathbone, of Greenbank : his mind seems to have been of an ethical rather than of a scientific turn. In his paper on "Mercantile Morality," Mr. Houlbrooke recommended the adoption of a simple principle as a general rule of conduct to be acted upon by merchants in all their transactions with each other, "Do unto all men as you would reasonably wish they in like circumstances should do unto you." In regarding the intricacies of commerce as capable of no other wholly satisfactory moral solution, Mr. Houlbrooke evinced no lack of discernment. He occupied the chair in the Society for five years.

In the year 1817 there was evidently an approaching crisis in the affairs of the Society; the Secretary complained that the Members were very irregular in their attendance, and that few took part in the public business; meetings, ordinary, extraordinary, and adjourned were held, till on December 5th, the Society received an application for admission from William Roscoe. He was elected by ballot an ordinary Member, and on the same evening was put in nomination by acclamation and was by ballot duly elected President. At the next meeting of the Society the following letter from Mr. Roscoe to the Secretary was read.

“MY DEAR SIR,

“May I beg that you will take an early opportunity this evening to express my respectful thanks to the Literary and Philosophical Society for the honour they have done me, and which you so obligingly announced to me, in admitting me a Member and nominating me to the distinguished situation of their President, a situation the duties of which I shall be happy to discharge to the utmost of my power. If it will not be informal for me to make my appearance amongst you this evening, I will be in attendance in the ante-room, and will wait their pleasure.

“I am, my dear Sir,

“Most faithfully yours,

“W. ROSCOE.”

Mr. Roscoe was introduced, the Members rose to receive him, and he signed the laws.

That Mr. Roscoe gave to the Society more than the patronage of his distinguished name, may be ascertained by the fact that, from the time of his admission to the year 1820 when he retired to his farm at Chat Moss, he himself presided at about two-thirds of the Society's meetings; and though his written

communications did not exceed four or five in number, the advantage of his remarks on the greater part of the numerous subjects discussed by the Society must have been great, and was highly appreciated.

One of Mr. Roscoe's principal communications to the Society was on "The application of the principles of morality to the intercourse of states," written in 1826, a subject which could hardly have been more interesting then than it is at the present moment. His sentiments may be given in his own summary. "What has the politician to do but to apply to the affairs of nations and the intercourse between states those principles of morality which he finds in the relations of private life." It may be worth stating that in 1784 Mr. Roscoe was a member of a Literary Society in Liverpool consisting of about a dozen persons. Dr. Currie, the Rev. W. Shepherd, the Rev. John Yates, Mr. Rathbone, and others. The meetings were held at the members' houses in rotation. But such was the political jealousy of those days, that this formidable cabal fell under the suspicion of government for sedition; and, in a letter to the Marquis of Lansdowne, Mr. Roscoe states, "I have good reason to believe we have been thought of importance enough to be pointed out to government, and in the present state of things, we have thought it expedient to suspend our future meetings."

Mr. Roscoe continued to hold the office of President from 1817 till the time of his death, which occurred in 1831, a period of fourteen years. A short inter-regnum followed.

In the year 1833 the Society appointed as its President, Mr. Joseph Brooks Yates, F.S.A., who remained in office till 1841, was re-elected for three years in 1844, and again for a similar period in 1849.

The written communications of Mr. Yates were

numerous, and indicative of a mind accomplished in literature and sensitively alive to all points of interest in antiquarian researches. From his own valuable library he frequently produced manuscripts and specimens of early typography, accompanying their exhibition with illustrative observations. His papers on ancient books of emblems deserve especial notice. As one of its founders Mr. Yates claimed the respect of the Society, and this became the private feeling of the members, from those qualities which eminently distinguished him. At his decease in 1856, an address of condolence to the family was drawn up at the request of the Council.

The Rev. Thomas Tattersall, D.D., formerly fellow of Queen's College, Cambridge, was elected President in 1841. His acquirements as a scholar and a theologian were held in high estimation. At his decease the sum of £2500 was contributed by his friends, as an additional provision for his family; the salary he received, as Incumbent of St. Augustine's Church, Everton, having been quite insufficient to enable him to accumulate anything of importance, even if his eminently charitable disposition had not induced him, to the full extent of his means, to relieve the distresses of others.

The following are the names of gentlemen, still living, who have been Presidents of our Society:—

Dr. Booth, F.R.S., elected in 1846,
 Dr. Dickinson, F.R.S., in 1852,
 Robert M'Andrew, F.R.S., in 1855,
 Dr. Inman, in 1856.

For the first twenty years of the Society's existence, the office of Secretary was held by Dr. Traill. During this period he made ninety-seven written communications to the Society, on subjects Geological, Chemical, Zoological, Archæological, Ethnological, Therapeutical, Meteorological, Mechanical, Geographical,

on Ancient and Modern Art, on the Prevention of Forgeries, and on Persian Chronology. Of Dr. Traill's papers, the titles alone are sufficient to indicate powers of research, discrimination, and good taste, such as rarely fall to the lot of an individual. It is much to be regretted that in his time the Society did not publish its proceedings, for the subjects chosen by Dr. Traill were such as possessed no mere local or transitory interest. For example, in 1813 Dr. Traill read a paper on a tumulus discovered near Woolton in 1808. The author, from many circumstances, considered this tumulus to be of Danish origin, especially from the resemblance of the remains to those of many Danish, or rather Norwegian, tumuli, which he had himself examined in the Orkney Islands. Not less interesting must have been his account of Sabrina, a volcanic island which appeared in 1810, and had disappeared a few months before the date of his communication in 1812.

Dr. Traill had, I believe, been elected President of the Society a few weeks before he left Liverpool, on his appointment to the chair of Medical Jurisprudence in the University of Edinburgh. He is still living, and has recently attained his 80th year. Great as was the lustre thrown on the Society by the President with whom he for so long a time co-operated, it seems beyond a doubt that the foremost and most influential place amongst the benefactors we on this occasion commemorate, must be accorded to Thomas Stewart Traill.

Very brief must be our notice of a few of Dr. Traill's contemporaries, who are now deceased.

John Bostock, M.D., a very active member, and author of several scientific works—the most important being a treatise on Physiology; the third edition appeared in 3 vols. He was a near relative of Mr. J. B. Yates.

Thomas Rickman was, for a time, Treasurer and Assistant Secretary, and the contributor of many papers. He was the Architect of St. George's Church, Everton, and the deviser of the armorial bearings of the Society. His "Architecture in England" has passed through at least five editions.

William Wallace Currie, an intimate friend of Roscoe, and son of the biographer of Burns.

Thomas Binns, a member of the Society of Friends, and an assiduous collector of topographical illustrations of the county of Lancaster. The results of his labours, in 30 large folio volumes, are now in the Free Public Library of Liverpool.

John Theodore Koster, a very active member, and author of several pamphlets on various subjects in practical mechanics.

Fletcher Raincock, M.A., Barrister, Mathematician, Fellow of Pembroke College, Cambridge; author of a work on logarithms.

The Rev. William Shepherd, LL.D. His principal work is a life of Poggio Bracciolini, of which two editions have been printed.

The most important event in the later history of the Society was the accession to its ranks of the members of the Natural History Society, in 1844. An increase of 39 ordinary, and 19 corresponding members was thus effected. It is on record that on the 21st of October, "on the motion of Dr. Hume, which was duly seconded, the union was agreed to unanimously, and Dr. Hume, Dr. Brett, and Mr. Cunningham were deputed to inform the members of the Natural History Society of the result, and to invite their attendance to take part in the election of officers, and in the general business of the Society." In a few minutes the members of the Natural History Society entered the room, and were received with the warmest expressions of pleasure.

Subsequently to 1844, the Society has become its own historian, in the regular publication of its proceedings, thereby not only giving a permanent value to the most worthy productions of its own members, but also acquiring, by the medium of exchange, the means of reference to similar productions in kindred Societies throughout and even beyond the kingdom ; an advantage which, within the last two years, has been greatly augmented by the exertions of our diligent Secretary.

It would not correspond with your wishes, were this address to be closed without reference to the kind and hospitable countenance given to the representatives of Literature, Science, and the Arts in Liverpool, by the worshipful the Mayor.

For the arrangements preparatory to the present meeting we are indebted principally to the untiring exertions of Cuthbert Collingwood, M.D., Honorary Secretary to the Society ; to the continued and most efficient assistance rendered by C. Clark, Esq. ; to the kind and valuable co-operation of A. Baruchson, Esq. ; and to the able manner in which were managed the departments undertaken by J. C. Redish, Esq., and C. Spence, Esq.

The kind offices of Dr. Ihne, Senior Vice-President of the Society, have secured to us this evening the enjoyment of hearing a concert of vocal music, by the members of the German Lieder-kranz.

The contributors of treasures in Art and Science have been many, and they have manifestly shown a high respect for our ability to appreciate true excellence. For all these services we return our hearty thanks.

At the conclusion of the address,

Mr. WILLIAM RATHBONE, one of the original founders of the Society, made a few remarks, referring to his connection with the Society half a century back. He afterwards paid a high compliment to the Mayor for the handsome manner in which he had cöoperated with them in celebrating their Jubilee, and concluded by proposing a vote of thanks to him.

The Venerable Archdeacon JONES spoke briefly of the interesting event which had brought them together, and congratulated the Society upon the distinguished success of their Festival Entertainment. He further congratulated the members on having still among them his old and valued friend Mr. William Rathbone, who took an active part in its foundation, fifty years ago ; and concluded by seconding the vote of thanks to his Worship the Mayor.

The vote was carried by acclamation ; after which, the other entertainments were resumed, and continued until past midnight.

APPENDIX II.

Suggestions*

OFFERED ON THE PART OF THE
LITERARY AND PHILOSOPHICAL SOCIETY
OF LIVERPOOL,

TO MEMBERS OF THE MERCANTILE MARINE,
*Who may be desirous of using the advantages they enjoy for the
promotion of Science, in furtherance of Zoology.*

INTRODUCTION.

THE science of Natural History necessitates two methods of investigation. One method is the study of the external and internal characters of natural objects, their peculiarities, resemblances and differences. The other is the study of their manners and habits; the conditions under which they are found; and their distribution over the earth and seas.

The first method requires *closet* study, and may be most effectually pursued by the stay-at-home naturalist; the second can only be followed where the living objects themselves are to be found. Given the supply of specimens, the one may be carried on within the walls of a Museum; the other can only

* On the proposal of the Secretary, and in furtherance of the views developed in the paper at page 46, "On the Opportunities of advancing Science enjoyed by the Mercantile Marine," a sub-committee was appointed to draw up some hints which might be useful to such merchant officers as were willing to make good use of their advantages for promoting Zoological investigation. The sub-committee consisted of Dr. Collingwood, Mr. T. J. Moore and Dr. Walker. To these were subsequently added the Rev. H. H. Higgins and Mr. I. Byerley. To Mr. Moore was intrusted the task of preparing a paper to be put into the hands of such persons as were likely to avail themselves of such hints, and the following suggestions were adopted by the Committee, and ordered to be printed in an Appendix, and further circulated among Members of the Mercantile Marine.

be completely accomplished by *observation* in every land and every sea, at every season, and during many years.

The second method *may* be independent of the first, but followers of the first are almost entirely dependent for their very material on the contributions made by the followers of the second, or by less intelligent providers of specimens. Unquestionably every student should cultivate both methods as far as circumstances permit, but in an inverse proportion to his advantages for pursuing one, will generally be his facilities for following the other.

The closet student with his books and microscopes and other advantages, can profit to the fullest extent by the labours of his predecessors and contemporaries. He can carry on investigations into new fields of discovery and bring to light previously hidden laws of structure or even of development,—studies requiring long and close application and the examination and comparison of specimens from widely distant parts of the world. As a rule *he* must limit his acquaintance with living nature to the inhabitants of his native country, to hurried observations of those met with in a brief summer tour, or to the “cabined, cribbed, confined” specimens in a menagerie or aquarium.

The field or ocean naturalist on the other hand, if devoting himself exclusively to his science, revels in the contemplation of the habits, manners and instincts of created beings in any and every part of the world ; yet if a collector, and an ardent one, he cannot attain such a close acquaintance with the internal structure, or even with the development, of anything like the number of animals of widely different kinds and widely distant countries as can his brother of the closet. How much less can he do so if from professional or other duties he is prevented from devoting more than a portion of his time to the study of nature ! Yet though the closet and field naturalists cannot be independent of each other, each class

may derive many and great benefits from the observations and labours of the other. Owen could not have studied so long and so closely as he has done the bony frame-work of animals, if he must himself have gone to New Zealand and sought for that single and very imperfect bone from which, being sent to him, he first made known the fact of a race of birds of gigantic size and remarkable character having formerly existed in those remote islands, and pointed out so accurately the kind of bird it must have been, that subsequently, when bones of other parts in considerable numbers, and ultimately a complete skeleton, were discovered and brought to England, his deductions were fully and incontestably proved.*

On the other hand, had the discoverer of this bone himself sought to solve the problem of the kind of animal to which it had belonged, it would have required vast research, in comparing various parts of skeletons of very various kinds, and a long study of the value and significance of seemingly trifling modifications of form and structure, to have approximated at all to a solution of the question.

Take another illustration. Everybody has seen, not only in museums and the shops of dealers, but on the mantel-piece and side-table, the shells of the Pearly Nautilus, shells which for beauty of lustre and elegance of form are unsurpassed; while their chambered structure evinces important differences in the living inhabitants from those of all other shells. These shells are so plentiful as to be sold for a few shillings only; and two or three species are known to exist; while the *extinct species*, of which fossil remains are found, often very perfect and beautiful, may be counted by hundreds. Yet though the recent shells have been long known and im-

* The bone referred to was a thigh bone broken off at both ends, fully described and figured in the Transactions of the Zoological Society of London, for 1839. Subsequently several distinct species have been made out by Professor Owen from bones collected in New Zealand, all fully described in later volumes of the same publication.

ported in such abundance, the *animals* which formed them remained almost unknown to naturalists until the year 1829. Previously, the animal had only been very imperfectly figured, and still more imperfectly described, by a Dutch naturalist in the 18th century, who had seen a living example. Cuvier never saw a specimen of the animal, though greatly desiring to do so. He prophetically said it would never gladden his eyes, and they were closed in death, though but only a few days (?) when the first specimen reaching Europe was sent to Paris for his inspection. Subsequent critical examination served to establish the existence of a character of the highest importance, that of the possession by the Nautilus family of double the number of gills found in any other family of the class of animals to which it belongs, thus placing in a still stronger light the difference in structure and relationships of the numberless fossil species, for long periods, so abundant upon the earth.

Both these notable instances show how greatly even the most advanced closet student depends for most important material upon those who may be called, for distinction's sake, *field naturalists*; how greatly the latter may aid the former; with what a rich return in knowledge they may be repaid; and what a flood of light may result from the combined labours of both.

Again, the natural history of any class of animals cannot be fully known until all the different species thereof are ascertained; how long each species has existed on the earth or in the waters; how widely it is distributed through the same; its habits, whether migratory or stationary, solitary or gregarious; its mode of reproduction and course of development; its seasonal and other changes; its food and mode of obtaining it; its haunts; its powers of offence or defence; the length of life of individuals; and numerous other particulars. Only in proportion as these various facts are cor-

rectly ascertained of *individual species*, is it possible to arrive at correct conclusions relating to any larger group of animals, and to elucidate the great laws of animated nature. Much has already been done in this direction, but very, very much more remains to be accomplished.

The very first step and the foundation of all subsequent generalizations is the *correct determination of the different kinds, or species*, of animals ;—and this is by no means so easy a task as might at first be supposed. Some species approximate to others so closely as to require careful examination to distinguish them : others vary so much as to necessitate the comparison of many specimens before all their points of difference can be ascertained. Among large animals species may generally be recognized without much difficulty ; but very frequently, and particularly among minute objects, the closest examination and comparison with descriptions and drawings are necessary ; while often the assistance of students of the particular tribe of objects must be sought as indispensable.

Scarcely inferior in importance to science is the *knowledge of the range of species*, to what extent, great or small, they are distributed over earth or seas. Indeed Agassiz, one of the greatest Naturalists of this or any other age, goes so far as to assert that “ every new fact relating to the geographical distribution of well known species is as important to science as the discovery of a new species. Could we only know the range of a single animal as accurately as Alphonse de Candolle has determined that of many species of plants, we might begin a new era in Zoology. It is greatly to be regretted, that in most works containing the scientific results of explorations of distant countries, only new species are described, when the mere enumeration of those already known might have added invaluable information respecting their geographical distribution. The carelessness with which some naturalists distinguish species, merely because they are found in distant regions,

without even attempting to secure specimens for comparison, is a perpetual source of erroneous conclusions in the study of the geographical distribution of organised beings, not less detrimental to the progress of science than the readiness of others to consider as identical, animals and plants which may resemble each other closely, without paying the least regard to their distinct origin, and without even pointing out the differences they perceive between specimens from different parts of the world. The perfect identity of animals and plants living in very remote parts of the globe has so often been ascertained, and it is also so well known how closely species may be allied, and yet differ in all the essential relations which characterize species, that such loose investigations are no longer justifiable."

It is important to observe that in cases of close identity, real or apparent, between animals, accurate observation of their respective habits and other circumstances connected with their life-history will frequently materially assist to a right conclusion.

From the foregoing observations the following conclusions may be drawn :—That the knowledge of Natural History may be largely promoted by those "who go down to the sea in ships," by the collecting of specimens, whereby new kinds of animals may occasionally be obtained ; by recording the time when, and places where they occur, thus adding to our knowledge of their distribution ; by observing their habits and mode of life, thus filling up many a blank page in the history of animated beings, and often assisting materially in elucidating their true relations to other animals ; while occasionally it may happen that specimens, or information relative to habits, may be preserved, of animals which may, in no long time, become extinct, as have several large species of birds during the last 20 years, as the great Auk, (probably) the Philip Island Parrot, the *Didunculus*, &c., and perhaps the Moa of New Zealand.

Perfect certainty regarding species, however, is of the utmost importance. On this one point everything else will turn. It is, in fact, the *exact determination of the thing spoken of*; and unless that determination be correct, any record of occurrence or notice of habits will be vitiated. Astronomical observations, however correctly taken or elaborately worked up, would be of little value, if there were any doubt as to the particular star observed; so of any notes of species, if those species be incorrectly named; *unless* indeed, examples of the species accompany the notes.

BUT if this latter be the case, if examples accompany the notes, all the responsibility for the correct naming of species may be at once transferred to others better placed for determining them, either by access to rare or costly books, or by their familiarity with the particular tribe of animals to which they belong.

We come then briefly to this:—That large and often important additions may be made to Zoological knowledge by members of the Mercantile Marine, by recording places of occurrence, and notes of habits, of such living objects as may come under their observation; but that to be of service, the animals to which they relate must be determined with the *strictest accuracy*, (by no means an easy matter,) or *be accompanied by specimens of the objects spoken of*, which will at once remove the difficulty. Of course the acquisition of specimens is of itself a great object to Museums, Collectors, and Students. It is here, however, considered subordinate to the acquisition of a knowledge of their life-history,—but it will in fact be found to be almost absolutely necessary to the imparting of that knowledge.

Let us suppose the case of a Merchant-Captain, or Officer, really desirous of doing something, however trifling, to add to our scientific knowledge. A land bird alights exhausted on the rigging of his ship, far out at sea—unless the bird be

captured and preserved, to be produced along with the statement of its occurrence, that statement would be of little value, unless the observer were an accomplished ornithologist, and had actually handled the bird in order closely to examine and determine it. Suppose a Squid or a Cuttle Fish be obtained. The fact (with the lat. and long.,) would be worth recording, but not unless the specimen were preserved also, unless the observer were a student of this particular class of animals, and knew, or could determine from his books, the exact species; for the known kinds of these animals are numerous, while many yet doubtless remain unknown.

So with Fish, with Crabs, Shells, and all other animals; unless the observer be a student of these particular kinds of animals, and able of his own direct knowledge, or from his general acquaintance with the subject, authoritatively to determine the species from well selected and often rare and costly books, there and then on board, his notices of them would be of little value, *unless accompanied by actual specimens of the things spoken of*. But if so accompanied, so simple a thing as a reference to them by a numbered label, would at once save him from all trouble and anxiety on this score, leaving it to his arrival at port, to settle these points by the aid of others, or to leave *that* portion of the business entirely in their hands. This bringing home of specimens in elucidation of notes and observations need not be a never-ending matter. Once done, it may not, for that particular kind, need repetition. One or more preserved examples of a kind may be kept by the Collector, which once named may serve for future references, or his observation will become quickened, enabling him to appreciate and retain a firm recollection of the particular points of specific distinction. Very many specimens of high scientific interest, may be preserved and packed in such a way as to be readily accessible for reference, without occupying more space, than may easily

be spared, even where room is so much an object, as on board ship. There are of course, small shells, crustacea, and other objects of little bulk.

It only remains therefore, to point out the less obvious methods of collecting; the chief methods of preservation; the most serviceable material for both, and to direct those who are desirous of further information to some of the most useful works of reference.

MAMMALIA.

Under the term mammalia are comprised all those animals which suckle their young, including not only quadrupeds, ordinarily so called, but also the seals and the more fish-like creatures of the whale and dolphin kinds. These aquatic animals are rare in museums, and many species are very imperfectly known. Instances of their being met with are well worth recording, and specimens should be preserved whenever practicable. When it may be inconvenient to save the skin or skeleton, the skull should at any rate be secured. Notes of the date and place of capture, and whether occurring singly or in shoals, as well as of any other circumstances that may be noticed, should be recorded in a note-book at the time, or be written on a label and attached to the specimen.

Many of these marine forms are found only in high latitudes, and out of the general course of trading vessels. Such specimens as may be met with should be made the most of. The dugongs of the Indian seas and the coast of Australia are great desiderata in England; as are also the lamantins of the West coast of Africa, and the manatees of the West Indies and the coasts of Guiana and Demerara.

The skeletons as well as the skins of these are much wanted, and both may be preserved from the same creature. There is but little skill required in either operation. *The skin* may easily be taken off the carcase: as much as possible of the flesh and

blubber should be removed, and a mixture of one-third salt and two-thirds alum rubbed all over the fleshy side of the skin. When this has been well done, place the skin in a barrel with a quantity of the alum and salt above and below it, as well as between all the folds. Turn it and rub it with the salt and alum daily for four or five days, according to the size of the animal, in order to ensure its being well cured. After lying two or three weeks in the brine thus produced, it may be taken out, sprinkled with more salt and alum, and packed like a wet hide; or if more convenient, it may be dried by exposure to the air. When alum is not to be had, salt alone may be used.

The above method is applicable to large skins of all kinds.

To preserve *the skeleton*, cut off all the flesh from the bones, but without separating them more than is necessary. Tie them carefully in coarse strong canvas or sacking, and tow them after the vessel, or otherwise soak them till the remaining flesh has rotted off. They should be examined occasionally, in order to tie up in separate bags the small bones of each limb, before they become divided and mixed. This is desirable to save trouble in afterwards sorting them, and to prevent loss.

When the bones are quite clean, white, and free from grease, they may be dried and stowed away, with a suitable label annexed. Care should be taken to cut out from the flesh *all* the bones, including those of the tongue, &c., and vigilance exercised that none be lost.*

When circumstances prevent either skin or skeleton being preserved, *the skull* may yet be saved, and, if so, should by all means be secured. The flesh being removed, it may be cleaned by towing as directed for skeletons. If notes of the sex, colors and measurements of the animal can be taken, they

*An admirable skeleton of a half-grown Indian rhinoceros, prepared in the above manner, may be seen in the Free Public Museum of Liverpool; the skin of the same animal was also preserved and cured in the manner pointed out above.

will be of value, especially should the species be rare. A sketch of the relative position of the blow-hole, hump (where it exists) and of the flippers is desirable in the case of rare specimens of the whale and dolphin kinds.

Professor Owen, speaking of the National Museum in a little work lately published by him,* draws special attention to the large marine mammalia, the whales and seals, and strongly urges the securing of specimens, as their rapidly decreasing numbers and more restricted range, owing to the eagerness with which they are pursued and destroyed for commercial purposes, point to their speedy extermination. One of the chief objects of his book is to secure ample space in the British Museum for the proper display of the skins and skeletons of these creatures, not only on behalf of the public, but for "the special student of this least known and most difficult branch of mammalogy."

Land animals of great rarity and interest, such as the gorilla of South West Africa, and the oranges of Borneo and Sumatra, may be *best* preserved as follows :—Lose no time in taking off the skin ; let this be done very carefully. Leave no bones at all in the skin, nor any flesh. Immerse the skin at once in the strongest spirit that can be procured, taking care that it gets well between every fold, and that no part is exposed to the air. To ensure full contact of every part with the spirit, lift up the skin occasionally. If possible, after a day or two, draw off the old spirit, and supply its place with *new*. Absorption into the skin is so great, and evaporation, in such hot climates as these animals are found in, is so rapid, that unless the spirit be renewed, the preservation may not be thoroughly effected. Let the barrel be proportioned to the bulk of the skin, tie the skin in canvas to prevent chafing against the staves ; put in as much grass or other light material

* "On the Extent and Aims of a National Museum of Natural History, by Professor Owen. London : Saunders, Otley, and Co. 1862." 8vo. Price 6s.

*as will prevent all shaking, and fill the barrel with spirit to the bung.**

The bones of such animals as the above are too valuable to be left behind. The entire carcase, without separating from it a single bone, may be exposed to ants, or other insect cleansers, if properly secured against more powerful depredators; and when partly eaten by these little creatures, and partly dried by the sun, a semi-mummy, it may be packed in a suitable box, until its arrival at home. This was done with the entire skeleton of the gorilla referred to below, and not a bone was lost or misplaced. The least possible amount of labour suffices for this method of preserving a skeleton.

Animals may be preserved bodily *in spirit*, without any further trouble than making a small incision in the skin of the abdomen to allow the spirit access to the intestines—care being taken that the intestines themselves are not cut; that the spirit be strong; and also that it be, if possible, changed within a short time for fresh spirit. The only limit to the size of the animals thus treated is the quantity of spirit that can be afforded. It is by far the best plan for all small mammalia, such as bats, moles, mice, &c., and really involves very little trouble.

For those who may have opportunities of procuring quadrupeds, and desire to preserve their skins for stuffing, the following directions may be serviceable, though an hour's practical instruction would give a clearer notion of the process than can possibly be obtained without it.

To prepare and preserve Skins of Mammalia.

The animal to be skinned should be placed on its back, and an incision made down the middle of the abdomen, care being

* In this manner, a skin of a large gorilla, also in the Liverpool Museum, has been received in a condition leaving nothing to be desired, far surpassing any that have been previously imported. If spirit be not available, salt will be the best substitute.

first taken to divide the hair to the right and left, and then to avoid cutting through the abdominal muscles.

The length of the incision will depend much on the skill of the operator. A novice had better make it from the collar-bone to within a short distance of the vent ; as he gains skill, a shorter opening will suffice to enable him to remove the carcase. A small quantity of powdered chalk, or of plaster of Paris, should be at hand, to be used from a pepper-box in dusting over and absorbing the blood whenever it may be troublesome, or endanger the cleanliness of the fur. The skin may then be removed from either side of the body, as far as the fore and hind legs, by a careful use of knife and fingers. The fore legs should be separated from the carcase by cutting between the shoulder-blades and the ribs ; and the hind legs, by cutting the integument which binds the head of the thigh-bone to its socket in the hip. Leaving the separated limbs for a time, the operator should continue skinning the body downwards to the tail, the gut being cut through about an inch from the vent, and the tail cut off at the first joint. The skin may then be reversed and separated from the carcase upwards to the neck. Continuing the inversion, the whole of the neck should be skinned as far up as the skull, when, if the head be too large to be drawn within the reversed skin of the neck, as in horned animals, it may be separated from the skull at the atlas or first joint of the vertebræ. The skin should then be turned with the hairy side out, and a fresh longitudinal incision made therein from the chin to a short distance down the throat, in order again to get at the skull, which must be carefully and cleanly skinned down to the lips, taking particular care to cut the ears off close down to the skull, and to avoid cutting the eyelids and lips. Carefully skin the lips to the margin and even beyond, so as to leave as great a portion as possible of the inner skin attached, in order to preserve the natural appearance of the mouth when the animal

shall be ultimately stuffed. The incision down the throat, however, should be avoided whenever the head can be skinned and cleansed by drawing it through the neck. This can be done with all except horned animals. The eyes should be removed by pushing them in a forward direction out of their sockets by a flat piece of wood, or the handle of the knife, and cutting the nerve, when they will be displaced without much difficulty. The whole of the flesh, tongue, and brains, should be removed from the skull as cleanly as possible, the last being extracted from the hole at the base of the skull by a small wooden scoop, or by enlarging the hole so as to admit a larger instrument; but this enlargement should be *avoided when possible*, because of the injury it causes to the skull.

The fore and hind legs may then be proceeded with, and should be skinned down to the very hoofs or claws. The flesh should be carefully removed from the bones of the legs, *but on no account should the bones be cut away*; they should be left attached to the hoof or claws, and all saved as far as the shoulder and the hip. The tail may be skinned by baring the first joint or so, and tying thereto a stout string or cord, fastening it to a beam, and slipping the remaining length out of the skin by means of a cleft stick, with a square surface made to clasp either side of the skinned joint, and smartly pulling the stick to the end of the tail.

The whole skin should now be examined, and all particles of flesh still adhering must be carefully removed. The whole of the inner surface, especially about the lips, eyes, and vent, is to be well and amply smeared over with arsenical soap, or other preservative, if this, the most valuable, be not at hand. The leg bones must be well covered with the preservative, and, after being slightly wrapped round with tow, or other material, to prevent them from adhering to the skin, should be returned within the extremities. The skull, having been well dressed with preservative, should have its cavities slightly filled out

with tow, cotton, or other light material, and replaced within the skin. The body may be slightly stuffed out with any light material at hand, and the abdominal incision slightly sewn up. The hair should be well smoothed and cleaned, and any external part of the skin destitute of hair, touched with the preservative. A parchment or card label should be tied to one of the legs, and the date when the animal was killed, locality, native name, &c., recorded thereon. The skin may be carefully laid by in some dry and airy place out of the reach of vermin and insects, and there remain till thoroughly dry, when it may be placed in a box or chest, care being still taken against the access of insects, &c., the box should, therefore, be as air-tight as possible, and some camphor or other drug obnoxious to insects placed therein.

Great care should be taken in all the above processes *not to stretch* the skin, because it is generally impossible afterwards to reduce it to its former size. The *shrinking* of a skin is of little moment, as it can, when damped for stuffing, be easily pulled out to its former size ; but *stretching* should be carefully guarded against.

BIRDS.

In ornithology, members of the Mercantile Marine cannot do better than take every opportunity of securing such land birds as may alight on board their vessels while at sea, and either preserve their skins or put them in spirit, previously making a slight incision in the abdomen, carefully noting the latitude and longitude, and the date. Any information that can be obtained relative to the migrations of birds will be useful. Instances of migratory flocks being seen on the wing at sea would be worth recording ; particularly noting the latitude and longitude, the direction of the flight, and the direction and force of the wind. If specimens can be shot and preserved, the value of the observation will be, of course,

very greatly increased, as it would put the identity of the species beyond a doubt. Opportunities for collecting eggs and nests of birds will not often fall to the lot of members of the Mercantile Marine, especially as regards land birds. As, however, skins are very much more frequently collected than eggs and nests, the chance of obtaining novelties is proportionally greater, and such opportunities of obtaining them as may occur should be made the most of.

Great circumspection, however, is necessary. For eggs to be of value to the ornithologist, it is necessary to be *certain* of the species to which they belong. In all cases, therefore, where it may be possible to capture one or both of the parent birds, as well as the eggs, it is strongly recommended to do so. So high a value is placed by modern collectors of eggs on correct identification, that no trouble is considered too great which may be found necessary to ascertain with accuracy the parent birds.

Mr. Alfred Newton, one of the most zealous collectors of eggs of the day, gives the following advice on this point in a little pamphlet written by him for the Smithsonian Institution of Washington, and subsequently published by him in England.*

“The most satisfactory, and often the simplest, way of identifying the species to which a nest of eggs, when found, belongs, is to obtain one of the parents by shooting, snaring, or trapping. But it sometimes, in practice, happens that this is found to be difficult, from one cause or another, such as the wary instinct of the birds, or the necessities of his position compelling the traveller to lose no time, or the scarcity of the species making him unwilling to destroy the individuals. In any of these cases, there is nothing to be done but to make as

* “Suggestions for forming Collections of Birds’ Eggs, by Alfred Newton, M.A. Published by Edward Newman, 9, Devonshire-street, Bishopsgate, London. Price 6d.” This little pamphlet is strongly recommended to all those who are disposed to take a special interest in the subject of which it treats.

careful an examination as circumstances will admit, of the precise situation of the nest, the materials of which it is composed (supposing that the collector cannot bring it away with him), and accurately to survey the surrounding locality, to observe by what species it is frequented ; all the particulars of which examination and survey should be fully noted down at the earliest opportunity possible. Should, however, either or both the birds be killed, they should be skinned, or at least some characteristic part of each preserved, and duly labelled, to correspond with the inscriptions subsequently put on the eggs, and always with a reference to the collector's journal or note-book, wherein fuller details may be found.

“ The collector of eggs is especially warned not to be misled by the mere fact of seeing birds around or near the nests. Many of the crow family (*Corvidæ*), are great eaters of eggs, and mistakes are known to have originated from birds of that kind being seen near nests of which they were certainly not the owners. Others, such as the Titmice (*Paridæ*), though not plunderers, obtain their food by incessantly seeking it, even in the very localities where many species build. It often happens, also, that two different birds have their nests situated very close to one another, and if they be allied species the collector may be easily deceived.”

The best method of blowing eggs is to make a *single hole in the side*, and not at either end as is commonly done. The latter method breaks the outline of the egg, and doubles the risk of cracking the shell. The former method answers every purpose, and, when the egg is placed with the hole downwards, there is nothing to offend the eye. The egg may be blown by means of a blow-pipe or a stalk of grass. The hole being made somewhat larger than the tip of the pipe or stalk, the contents of the shell cannot but escape when air is blown in. A rat-tailed file, with a very sharp point, is a very effectual borer for making the hole in moderate and large-sized

eggs ; a brad-awl, sharpened to a point, or a three-cornered needle, will suffice for small ones.

In the very common event of the young bird being more or less advanced towards hatching, considerable care and dexterity will be required in extracting it. Mr. Newton recommends gumming on the side of the shell, one over another, a series of circular pieces of paper (such as would be cut by a punch for gun waddings), and then slit in several places from the circumference half way towards the centre, with a pair of scissors, in order to allow them to be accommodated to the convexity of the egg. When dry, the hole is to be made through these, which will add considerably to the strength of that part of the shell ; and the embryo is to be very carefully cut up and drawn out by skilful manipulation with the most slender knives, hooks, or scissors, that can be procured. The patches of paper can easily be removed by softening them sufficiently in water. Care should always be taken to clean the eggs well out, to rinse them with a little water, and to leave the egg hole downwards until thoroughly dry.

When dry, each egg should be wrapped in a small quantity of cotton wool, or the lightest substitute available, and all out of one nest, packed within the nest, if it be saved, or put together into a chip box. Such box, or nest of eggs, should be most carefully labelled with the place and time of capture ; and the name, native or otherwise, of the parent birds, stating particularly the circumstances warranting the application of the latter, such as " Parent bird shot on the nest, and sent herewith, numbered so-and-so." As the small boxes and nests of eggs accumulate, they should be carefully packed in a box of larger size, and so as to prevent shaking. Wrapping each egg separately is far preferable to putting them in saw-dust, sand, grain, or similar material, as by shaking in travelling the eggs get to the top, the sand, &c., to the bottom of the box, and much damage ensues. .

The following directions for skinning birds may be useful in the absence of practical lessons :—

To Prepare and Preserve Skins of Birds.

Birds, when shot, should have the mouth and vent stopped up with cotton, wool, or fine grass, and the wounds dusted with powdered chalk, or plaster of Paris, to prevent any discharge of blood, or mucus, from soiling the feathers. These precautions may be repeated when the body is cool enough for skinning. The feathers being carefully divided to the left and right, down to the centre of the under surface of the bird, an incision is to be made from the upper part of the breast to the vent ; and the skin on either side separated from the flesh by the fingers, very little aid being required from the knife ; the legs should be cut from the trunk at the knee-joint, that is, between the thigh and leg bone in the fleshy part of the leg, and the skin separated from the body as far as the vent and tail, both of which must be cut off at a short distance from their termination. This is, perhaps, the most difficult task in skinning a bird, and considerable care will be necessary. The last joint of the vertebræ supporting the tail may be left attached to the skin to continue its support to the tail feathers, but all the flesh and the oil-gland must be carefully removed. Skin the back upwards till the wings are reached ; separate these at their junction with the body, taking especial care here not to cut the skin ; tie the mandibles together with a thread passed *very* carefully through the nostrils with a fine needle, so as not to injure the nostrils (which are very delicate, and possess characters of scientific importance), and leave a double thread attached somewhat longer than the neck. Draw out the neck as far as the skull, and skin carefully round this as far as the base of the mandibles, taking care in removing the eyes not to puncture, or otherwise injure, the lids ; cut away the tongue and all the flesh from the skull, and scoop out the brain, to do which it may be necessary to remove a small

portion of the base of the skull, yet so as not to injure its contour, or lessen its strength. The legs are now to be skinned as far as there is any flesh, which must be removed from the bones, anointed with *arsenical soap or other preservative*, then slightly wrapped with tow or cotton, and returned to their place. In a similar way, the wings must be skinned, except that the flesh from the second joint onward may be removed through a fresh incision on the inner side of the wing instead of drawing out the whole length of the bones. Having dressed these with the soap and replaced them, the skull is to be plentifully smeared, and its cavities filled with cotton; the whole of the skin being likewise *dressed with the arsenical soap*, is to be restored to its natural position; the head drawn back through the neck by means of the thread attached to the mandibles; the feathers carefully smoothed down; the skin slightly stuffed with tow or cotton, and sewn up. A neat label having notes of the following particulars should be tied to one of the legs:—

“Native and other names; sex, verified by dissection, if possible; colour of the eyes, cere, legs, and fleshy parts, before fading. Date when, and place where killed.”

The above notes should always be *promptly taken and attached to each specimen* immediately upon being skinned, in order to insure perfect accuracy. A number may be added to the label referring to a page in the note-book, wherein all other particulars that can be obtained should be recorded, as to habits, food, &c., and to ascertain the latter, the crop and gizzard should always be examined.

The skin may now be rolled in a strip of paper and pinned or tied moderately close to prevent the feathers being ruffled, and then placed in a safe and airy place till dry, when it may be stored in an air-tight and vermin-proof box or chest, with other skins, and camphor placed therewith, as directed for skins of mammalia.

Great care should be taken throughout to avoid cutting,

tearing, or stretching the skin, or ruffling the feathers ; and the beak and nostrils, and the scales of the legs, should be carefully preserved from injury.

Large-headed birds, such as ducks and woodpeckers will require an incision to be made down the upper part of the throat, in order to skin the skull and remove the flesh, for, it is impossible in these to draw the head through the narrow skin of the neck, which, as well as all other parts of the skin, must be carefully kept from being stretched, or it will become most unsightly, and can never be reduced to its proper size.

Before throwing away the carcase of any rare bird, two additional preparations may be made of considerable interest to the ornithologist ; the first, by carefully removing the tongue and trachea, or wind pipe, cleaning them of loose integument, placing them in water a sufficient time to soak out the blood, and then pinning them on a board to dry, or, to prevent the windpipe breaking, which it is very likely to do, inserting a slender stick within it, and allowing it to dry thereon ; the second, by preserving the sternum or breast-bone of the bird, with all the smaller bones attached to it, the furcula or merry-thought, the collar and shoulder bones, and the processes which unite the sternum to the ribs. The flesh should be removed with care, and the sternum soaked in water slightly boiled, to remove the blood and flesh, and then dried. Both should be carefully labelled with the name of the bird to which they belong, or a reference to it by number. Entire skeletons of rare birds may be prepared in the same manner as those of mammalia ; or, when small enough, they may be put whole into spirit until arrival at home.

REPTILES.

Reptiles of moderate size are best preserved in spirit, a portion being injected into the mouth and vent. In the largest of those thus preserved, an incision should be made in the abdomen to allow the spirit access to the intestines, previously

to placing the creatures in the jar or barrel. Specimens too large to be thus disposed of, as crocodiles and large lizards, should be skinned according to the directions given for mammalia. Tortoises and turtles must have the lower shell cut or sawed from the upper at their junction, and cut from the surrounding skin. The flesh can then be readily removed in a few slices, and the head, neck, and extremities can be skinned and preserved as usual. The application of arsenical solution to the eyes must not be omitted.

Specimens of snakes which may be inconveniently large to preserve in spirits must be taken to avoid rubbing off or breaking the scales, and to avoid receiving any scratch or injury from the fangs or poison, the vipers retaining the venomous quality of their blood even after long preservation.

There are many species of frogs, newts, salamanders, and other interesting animals, and such remarkable transformations as *Amphibia* in *all the different stages of development*, from the spawn to the perfectly formed animal, preserved in spirits and if possible, to secure identity, the different stages should be kept in separate bottles, and all the particulars that can be obtained relating to them should be recorded in the note-book, especially the date and place of collection, and referred to by numbers marked

of newts and salamanders are one very large kind—the *Sieboldia*—the length of two feet. This is a rare in European collections, and is preserved in spirit.

ould be preserved. They may be particular care should be taken in species they belong to, examples reserved, if possible, in order to

FISH.

In this, more perhaps than in any other class of animals, may the assistance of members of the Mercantile Marine be expected. Anybody can catch fish ; anybody can, with little care, skin and slightly stuff them, and, with less trouble still, can preserve them in spirit or even in salt. The species are excessively numerous ; the numbers of some kinds prodigious ; the forms of many are very remarkable ; and the beauty of others unsurpassed. *Yet fish are rarely brought home* by British collectors. Probably not fifty or even twenty species could be found at any one time in all the Natural History dealers' stores in the three kingdoms, while of birds, insects and shells thousands may certainly be obtained. Need more be said to commend this interesting class to the attention of those to whom this paper is addressed ? Even the markets and those who supply them with fish may most usefully be put under contribution.

Fish as well as reptiles are best preserved in spirit, and of this more anon ; but when the specimens are too large to be preserved they may be skinned. In order to prevent as much as possible the scales from being rubbed during this process, it is advisable to use some light thin substance, as old linen or cotton rags, bladder, sheet india-rubber, or even paper, to wrap the fish in, to save rubbing and chafing with the hands. This can be removed by damping when the skin is freed from the carcase. The incision for skinning may either be made down the centre of the abdomen, as in quadrupeds and birds, or it may be made midway along one side of the fish, from the pectoral fins nearly or quite to the tail. With broad-scaled or delicate fish this method has advantages ; the skin of the side being stronger than that on the belly, it does not so readily tear when being sown up by the stuffer ; in the case of delicate fish, and with broad-scaled ones, the loss of a few scales on *one* side is of less importance (those on the other being perfect) than on the median line of the belly.

All the flesh should, of course, be carefully removed, not only from the skin but from the base of the fins and tail and from the skull. All these parts should be well anointed with arsenical soap, or whatever preservative is used instead of it. The skin may then be very *slightly* stuffed with light material, lightly stitched up, and when thoroughly dry, wrapped in paper before being packed away, in order to prevent damage to the fins and scales, which are very easily injured.

A less troublesome process than that of skinning the entire fish is sometimes followed, namely, that of skinning very little more than one side of the fish. Make an incision from the top of the head along the back, keeping slightly on, say, the *right* side of the dorsal fin, down to the tail; continue this incision from the tail, along the belly, up to the gills. Cut away this smaller half of the skin and remove the flesh from the other; and if the head be large, cut away a portion of the thickness of this also, but leave the mouth intact. Dress the larger half of the skin with preservative, pin it on a soft board, with all the fins, as well as the tail, fully displayed, and give proper convexity to the skin by lightly inserting cotton or other soft material between it and the board. When dry, the pins may be taken out and the board and cotton removed. When viewed from the side, the absence of the other half is not noticeable, while all that is really serviceable is preserved.

Fish are very subject to *parasites*. These should be carefully sought for on the eyes, lips and gills, as well as in the liver, intestines and stomach, in which also many other creatures, preyed upon by the fish, as smaller animals of its own class, crustacea, mollusca, &c., may be found. All these should be preserved in spirit and *carefully labelled with the name of the fish from which they were taken*.

As the colours of fish are always fleeting, and often extremely beautiful, notes should be taken while the specimens

are fresh, and if colored sketches can be made of rare ones, so much the better.

With reference to the preservation of fish in spirits the following points should be carefully attended to. Before immersion, a slight hole should be neatly cut in the abdomen without injuring the intestines, and a little spirit, if possible, injected therein and through the mouth and vent, light plugs of cotton being afterwards inserted in all three.

Tie to each fish a label of the date and place of capture. This may be written clearly and distinctly with a *good* pencil on stout writing paper, or on card, or best of all on parchment; or it may be written in ink, which, if allowed *to dry* before going into spirit, will not afterwards run. Where several specimens or species captured at the same time and place are put into one vessel, it will suffice to put the date and locality securely to this; but wherever any information relative to a specimen can be given, this should invariably either be affixed to it in full, or a reference to a note be attached.

Very small specimens are best preserved apart from large ones, say in pickle bottles. Thin-skinned and delicate fish should also be preserved apart from large and rough ones. All fish of any size should be separately wrapped in thin bunting, calico, or old linen, to prevent the loss of scales, and either wrapped securely, but lightly, with string, or be slightly sewn up before immersion in spirit. In order to insure preservation, it is extremely desirable, after four or five days, to draw off the spirit in which the specimens were first placed, and to substitute fresh spirit. The loss by absorption and evaporation makes this necessary. The fish, securely and separately wrapped up after having been in the first spirit, may be packed in a small barrel. The barrel must be *filled*, either with specimens, or with tow, hair, &c., to prevent tossing about; then headed up, filled with the strongest spirit obtainable,

rolled, and canted to let all enclosed air escape, then filled to the bung-hole, and securely bunged up, with a piece of tin nailed over to prevent the bung getting loose. In very hot climates it may be necessary to change the spirit a second time before closing up. Much will depend upon the heat, the mass of fish to be preserved, and the strength of the spirit. Risk of damage will be lessened by putting fish into three or four small barrels, rather than into one large one of equal capacity. To prevent rolling and shaking during the time specimens are being collected, an India rubber bag, or one or more bladders, inflated with air, may be put in with the fish to keep the barrels always full, and as more fish are put in, a proportionate quantity of air can be let out.

Dr. Günther, of the British Museum, in some instructions for collecting reptiles and fish, recently issued by him, recommends for the preservation and conveyance of spirit specimens the use of square boxes made of strong tin. When *filled* with specimens, the top should be soldered on, and the spirit afterwards poured in through a hole punched in the lid until every crevice is filled, when the hole is to be covered with a small piece of tin and securely soldered. These boxes would have to be made for the purpose; they are the lightest and most compact that can be used, and if made of slightly increasing sizes, may, until wanted, be packed one within the other.

American naturalists have a modification of this plan. They use tin boxes with as large a circular hole on the top as can be made, into which a brass collar fits to receive an iron lid screwing into it, a washer of leather or gutta percha between, further aiding in preventing the escape of spirit. The advantage of these cans consists in the facility with which they can be opened and closed. Empty ammunition cans answer nearly or quite as well.

When not convenient either to skin fish, or preserve them in spirit, they may be *simply salted*. For this purpose, cut

them open nearly to the back ; gut them ; fill them with coarse salt, and pack them in the same, with the addition of a little saltpetre.

INSECTS.

The opportunities for collecting and making observations upon insects will, probably, be as rare with members of the Mercantile Marine as those for observing and collecting the eggs of Birds. Instructions for preserving zoological specimens, however, would be very incomplete without some brief directions relative to this, the most numerous of all classes of animated beings.

The most profitable service that can be rendered will be, whenever opportunity occurs, to inquire into and secure everything illustrating the usefulness of insects to man, with a view to the possible extension of their good services. The silk-moths are a case in point. The *Ailanthus* silkworm, long known to naturalists, and for centuries cultivated in China, was introduced to Europe, in 1856, by the Abbé Fantoni, a Piedmontese missionary. It is now cultivated largely and profitably in France, and, being very hardy, is also being reared in England. More than forty species of silk-producing moths have been described by naturalists ; but the majority of the species are very imperfectly known, as to their food, habits, and transformations. Several of these have only been discovered within the last few years. Five of the new species are from Japan ; and, as silk-producing moths are widely dispersed through the East, it is quite possible to render important service, by procuring examples of the eggs, caterpillars, cocoons, and perfect insects, of any species known to produce silk, with samples of the silk itself. A yet greater service would be performed by obtaining and carefully conveying home *living* cocoons, to hatch and breed in this country, and

for the last purpose, a knowledge of the proper food-plant is most essential.*

Next to useful insects, illustrations of those which are the source of injuries to man will be worthy of attention.

Finally, the habits, transformations, and economy of Insects generally, are a most profitable field of study, whenever opportunity may occur, and illustrations of these are *well* worthy of preservation.

Butterflies, moths, and other delicate insects, may be killed with chloroform, with the vapour of ether, by holding them in the steam of a kettle, or by dipping a needle into a solution of oxalic acid, and piercing therewith the chest immediately behind the head. Butterflies may be killed also by pinching them smartly with the finger and thumb under the wings, but this is a very rough method, to be avoided when other means are possible. Very large moths should have the body opened, the contents removed, and replaced by fine cotton. Moths, butterflies, &c., should be pinned *between the wings*, with slender pins of suitable length, and stuck in *air-tight* book boxes, lined with cork; or on shallow trays, lined with cork or pith, and fitting into an *air-tight* chest; camphor, or other similar drug, being placed in each box or tray, in muslin, or other light material, to prevent minute depredators committing havoc amongst them, which they will not fail to do, unless great care and watchfulness be exercised. Great care should be taken to fasten the camphor beyond all chance of becoming loose.

Beetles may be killed instantaneously by immersion in

* For fuller particulars on this subject see a shilling pamphlet, by Lady Dorothy Neville, on the "Ailanthus Silkworm." Published at 162, Fleet-street; and "Notes on the Silk-producing Insects of India, and its adjacent countries," by Mr. F. Moore. Published in "The Technologist," for July, 1862.

A prize of 1,000 francs is offered by the Société Impériale Zoologique d'Acclimatation, at Paris, for the acclimatation in France, or Algeria, prior to December, 1866, of any new species of moth, producing silk fit for industrial purposes. The Acclimatization Society of London is also desirous of aiding in the naturalizing in England of silk-moths, or other creatures likely to prove serviceable.

boiling water; they should afterwards be dried on a cloth, or blotting paper, and either pinned through the *right* wing-case and arranged in boxes or trays, as above directed for moths, &c., or be put in small numbers into little chip or pill-boxes, with a little cotton to keep them from shaking. Beetles, and, indeed, *all* insects, *except moths and butterflies*, may be put into spirit, which will cause immediate death, and preserve them as long as it retains its strength, to secure which, fresh spirit should be added before putting a bottle in store. Spiders and caterpillars are most easily preserved in spirit, but *can* be preserved *dry* by puncturing the abdomen, squeezing out the contents, filling it with sand and letting it remain till the skin becomes sufficiently dry, when it may be shaken out, and the specimens pinned.

Pins of various sizes, suitable for insects, may be obtained of Messrs. Edelston and Williams, Crown Court, Cheapside, London, and of Mr. Edmondson, Basnett-street, Liverpool.

Insect boxes, lined with cork, may also be procured of Mr. Edmondson, in Liverpool, and in London, of Mr. Cook, 513, New Oxford-street, from whom all other necessary entomological apparatus may be obtained. In the absence of boxes specially prepared for insects, rough ones, which will answer the purpose of conveying specimens safely home, may be made as follows:—Cut into slices about a quarter of an inch thick any good bottle corks and bungs that can be obtained, and glue them in rows, at suitable intervals, in any shallow boxes or trays that can be made to shut perfectly close.

SHELLS AND MOLLUSCOUS ANIMALS.

The following excellent instructions for collecting specimens of this very numerous and important class of animals have been extracted from a little work published by the late William Swainson, and approved by Dr. Gray:—

“*Land* Shells may be got most plentifully early in the

morning, especially in rainy weather, on shrubs and grass ; the smaller kinds under moss—in the hollows of bones—under stones—in the crannies of the bark of trees, or under the moss at their roots—by the sides of ditches, and in other moist places.

“ *Fresh-water* Shells are to be sought after in quiet inlets, on the sides of rivers, lakes, brooks, and canals ; in ditches and ponds which are constantly full of water, and not disturbed by cattle or other means, and on the weeds and other vegetables which grow in them. To collect them, a net or tin spoon, pierced with holes, is required. The double shells, as mussels, and such like, however, mostly live on, or under, the mud.

“ The *Marine* Shells are very numerous, and, according to their genera, inhabit various places.

“ The cavities and surfaces of the rocks on the sea-coast afford periwinkles, limpets, sea-ears, mussels, &c. The two first kinds must be severed from the place to which they adhere, by swiftly passing a knife between them and the rock. If such of the large stones as are moveable are overturned, many sorts will be discovered sticking together on the underside ; and a great variety may be found on the sea-weeds, especially after a gale, when many of these plants are thrown up by the waves.

“ Such sand-banks and coral-reefs, as are for the most part overflowed by the tide at its lowest ebb, abound with thorny, and other oysters, &c.

“ Under the sand and mud, often to the depth of two or three feet, live many various tribes of cockles, and other double shells, many of which spout up the water, or sink the surface of their beds by which they may be discovered ; and here also, and in swamps, elephant's teeth, and other tubular shells are to be met with, the animals only of which are above the surface of the mud.

“ Several kinds live on the sea-shore, about low water mark,

immersed in holes which they scoop out within chalk, lime-stones, wood, &c., which must be broken or split to discover the enclosed shells. Pieces of the bed might be saved with the shells in them.

“ But trawling and dredging in deep water afford the best opportunities for collecting rarities, as among the rubbish, seaweeds, &c., which come up in the net, many curious sorts of scallops and other shells are to be got, which are not to be found near the land.

“ Many shell-fish may also be procured by baiting a wicker basket, open at the ends, but gradually narrowing inwards, like a mouse-trap. It should be baited at night, and let down from the vessel when at anchor. The refuse of fish or animals will answer as a bait.

“ If a bundle of straw is tied tight at one end, with a piece of meat in it, and is sunk to the bottom, many shell-fish, &c., will be found in it, if it is raised with the loose end uppermost. There should be a weight at the end to keep the straw down.

“ A common swab sunk to the bottom will bring up many shells and corals.

“ If the intestines of a fish are examined, many beautiful small shells will be found in them, and be easily separated after they have been for a few days in a bucket of salt-water.

“ If the mud brought up by the anchor is examined, very fine shells will frequently be found in it, particularly in the eastern seas ; the lead also brings up shells.

“ The natural skin or epidermis peculiar to many kinds of shells, should not on any account be taken off ; nor should the shells be touched with any corroding acid, as it spoils them.

“ Shells that have been exposed on the sea-shore to the effects of sun or water, lose their colour, and are rarely worth collecting.

“ It is particularly requested that no shells may be rejected, because they are common-looking, or ugly, or small.”

The simplest method of killing the animals of shells is to pour *boiling* water upon them, which causes immediate death. The animals of univalve shells can then be extracted with a long bent pin, or a piece of fine wire, hooked at the end. Care should be taken to remove every particle of the animal matter of all except the very smallest kinds, and when there is a shelly lid or covering (*operculum*) to the mouth of the shell, this should be carefully put in again when dry.

Bivalve shells, as mussels, &c., must have the animal matter removed with a knife, and the two shells *tied* together; otherwise, when dry, they will gape, and be unsightly, and liable to break. The shells, when thoroughly dry, should be wrapped or packed in cotton wool, or soft paper. Very small ones may be put together in pill-boxes, or small phials, with a little cotton, to prevent shaking. All captured at one time and place should be packed together, and carefully labelled with the locality, conditions under which found, as, "under stones," "among moss," &c.; and (*where they have been obtained by dredging*) *the depth in fathoms, and the nature of the bottom, whether sandy, muddy, or rocky, should be particularly named*. These last particulars are of the highest importance, not only in the study of recent conchology, but also to the geologist, as affording him hints as to the conditions under which similar kinds found in a fossil state also existed.

It is very desirable to preserve some of the specimens of shells *with the animals within them* in bottles of spirit, as it is only from the animals themselves that their true nature and relations can be accurately ascertained, as shown in the instance of the Nautilus, before spoken of. The specimens so to be preserved should be put in alive, as the spirit itself will speedily kill them.

Beside the animals bearing an external shell, there are whole families belonging to this class in which the shell is

concealed within the substance of the creature, as in slugs, cuttle-fish, and squids; or is altogether wanting, as in the highly interesting nudibranchs, or naked-gilled molluscs. These should be zealously and carefully collected and preserved in spirit: the small kinds in tubes or bottles of corresponding size, and labelled as already directed.

There are very many highly interesting molluscous animals which are found floating on the surface of the sea. These should be collected by means of a net consisting of a ring of iron, or a strong wooden hoop of a barrel, having a bag about eighteen or twenty inches deep, made of bunting. Three pieces of cord, about twenty inches long, should be tied to the ring at equal distance, and the ends tied together to a long line, with which the whole should be towed from the boat or ship on the water, so as to skim its surface. The net should be frequently examined, and the captures, however minute, put into small phials of spirit, and labelled with the date, and latitude and longitude.

Gulf-weed should be closely examined for specimens of these floating molluscs, which are great prizes to conchologists.*

CRUSTACEA.

All Crustacea (lobsters, crabs, shrimps, &c.) are *best* preserved in spirit, which, of course, immediately kills them. Specimens too large for this method should have all the flesh carefully removed. Access to it may be obtained by removing or loosening the upper shell in crabs, in lobsters, cray-fish, &c.; an incision may be made for this purpose down the middle of the under side. The claws must be taken off at the joints to extract the flesh if it cannot be removed by cutting through the integument on the inner side of the joints. If taken off, they must be carefully replaced. The whole of the

* Those persons who have the slightest inclination for studying shells should possess themselves of a copy of Woodward's "Manual of Mollusca," published by Weale, 59, High Holborn, London. Price 6s. 6d. This most admirable book is a library of itself upon the animals of which it treats.

shell should, subsequently, be immersed in spirit for a short time, or else be anointed internally with arsenical soap, to prevent the attacks of insects. This class of animals is very numerous, and will well repay collecting and studying. The small kinds, however minute, should be assiduously sought for and preserved.

ANNELIDS, OR WORMS.

Under the lowly designation of worms are included a considerable variety of creatures, which, though less frequently studied and collected, perhaps, than any others, are well worthy of attention. Many are really very beautiful when seen in a living state. The nereids, which burrow in sand or mud, when swimming reflect brilliant iridescent tints, and make their way through the water by a series of most graceful curves, which no one who is fortunate enough to see them can fail to admire. So little are they sought after, that though beautiful specimens, a foot in length, are to be found buried deep in the shores of the Mersey, they are almost as little known as if they inhabited the antipodes; and the exhibition of specimens in the Aquaria, at the Free Public Museum, never fails to elicit the admiration of all who see them. Other members of the tribe form tubes of sand and shell, by means of their flexible and extensive feelers, working like so many miniature elephants' trunks; other kinds spread out beyond the leathery tube in which they live, a beautiful spiral disc, like a plume of delicate feathers, which they instantly retract on the slightest alarm; others, again, form calcareous tubes, the mouth of which they close against all intruders by a most exquisitely contrived stopper. These are examples of a portion only of the numerous class of Annelids. They are to be sought for under stones, or buried more or less deep in sand or mud; their whereabouts being generally betrayed by some orifice, or depression, or by castings thrown up out of their holes. Those which burrow must be dug for with a spade or three-pronged

fork, deeply and quickly, or they will evade pursuit. Immersion in water to cleanse them is necessary to display their beauty. Those forming hard tubes generally attach them to shells, stones, &c. All these creatures can only be preserved in spirit; and those kinds forming tubes should be preserved *in them undisturbed*; or at least some example should be so saved. It is not always easy to prevent the animals slipping out; when they do so, the tube should be put into the bottles with them.

STAR-FISH AND SEA URCHINS, SEA ANEMONES AND ZOOPHYTES, ACALEPHS OR JELLY FISHES, CORALS AND SPONGES.

With the exception of the Jelly Fish, which are best secured by the towing net, while swimming near the surface, all the above creatures are to be procured by searching along the shore at low tides, and by the use of the trawl and dredge.

Star-fish may be preserved dry; very small kinds without any other preparation than a brief immersion in spirit. All large Star-fish should have the flesh removed. To do this, cut from the mouth to the tip of each arm, on the under side, with a pair of scissors stout enough to divide the internal frame-work. With a bluntish knife, the fleshy matter may then be easily removed from the centre and from each arm. Soak the skin in spirit, but very briefly, for fear of loss of color, and pin out the specimen on a piece of soft-board and place it in the sun, or before a fire, or in a strong current of air, so that it may dry rapidly. When thoroughly dry, fold in thin paper.

Echini, or Sea-urchins, are more difficult to preserve dry, especially those with very large spines. The flesh must be removed through the mouth on the under side; cut the skin surrounding this, and scoop out the flesh, but leave in the loose internal framework. Soak in spirit for a short time, and dry as above.

Specimens of as many kinds as possible of Star-fish and Sea-urchins should be wrapped up separately and preserved in spirit, dried specimens being insufficient for the examination of all parts of their structures.

Sea Anemones are difficult to preserve satisfactorily. If possible, cut away with a hammer and chisel a small piece of the rock to which they are attached ; place them in salt-water until they expand ; then suddenly transfer them to spirit while so expanded. When dead, it will be well to fold each specimen that is so attached in linen, to prevent damage from chafing, rendered more probable than usual by the piece of adhering rock.

Allied to the Anemones, though very much lighter and more graceful in form, are those beautiful, delicate, little, slender shrub-like objects so familiar to all who visit the sea-coast at low tides, where, though not frequently met with attached to the rocks, they are yet found in great abundance left in heaps by the receding tide. Careful examination will show to the naked eye, in many cases, that these objects are serrated like the teeth of a saw. The use of a pocket lens will reveal the fact that each of these serrations is a little cavity, and if placed under a microscope, in a little water, when fresh from the sea, each cavity will be found to have its own tiny occupant, whose structure and movements it will be most interesting to watch. A few observations like these will enable any person not previously familiar with these little creatures, to distinguish them from sea-weeds, with which they are not seldom confounded by ordinary observers. These *zoöphytes* should be carefully collected and preserved. For this purpose, preference should be given to those found attached at the base, to rocks, stones, &c. These will be alive. They should be carefully removed from whatever they may be fixed to, and plunged immediately into small phials of spirit, which, if neatly done, will generally result in the little occupants being

killed protruding from their cells, thus affording the best means of examining them, when living specimens cannot be obtained.

When procured by the dredge, it is less necessary to restrict one's self to rooted specimens, as those brought up will probably be living, having been torn from their hold by the dragging of the dredge. Many of these objects are very dwarfish in size ; minute specimens, therefore, found on small stones, shells, &c., should be saved, and may be put, shell and all, in spirit.

The Acalephs, or Jelly-fish tribe, vary greatly in size, from that of a pea, to monsters of a foot or two in diameter. They can only be preserved in fluid ; and of fluids, *spirit* is most generally available. Into this they should be placed as soon as possible after capture ; the small specimens, which should be carefully sought for, chiefly by the *towing net*, being put into bottles of proportionate size.

Corals, especially the smaller kinds, and in seas where they are neglected, are well worth collecting ; and the preservation in spirit of small specimens, or fragments of large ones, fresh from the sea, with the animal attached, is worth attempting. Of sponges, there is a very great variety ; and but little labour is necessary in order to their preservation. They should be carefully packed in soft material when dry.

It is most important that all the various kinds of specimens, here alluded to, should be fully and accurately labelled with the time and place of capture, and any additional information that can be gathered should either be added to the label, or entered at length in the note-book.

DIATOMACEÆ, AND OTHER MINUTE OBJECTS.

The following instructions are drawn up by the Society of Microscopists of Manchester. The objects to which they relate are exceedingly numerous, both in individuals and species. They will well repay the trouble of collecting, and of any time that can be devoted to their study. A small

microscope will be of great service in examining them, and will prove a never-ending source of interest and delight.

“ These minute forms are found in all waters, but the most interesting species are those found in salt water, especially shallow lagoons, salt-water marshes, estuaries of rivers, pools left by the tide, &c.

“ Their presence in any quantity is always shewn by the colour they impart to the aquatic plants and sea-weeds to which they are found attached, and if found on the mud, which is very frequently the case, they impart to it also a yellowish brown colour approaching to black brown if in great numbers.

“ This brownish pellicle, if carefully removed with a spoon (without disturbing the mud) will be found very pure. Capital gatherings of Diatomaceæ might be obtained by carefully scraping the brown-coloured layer from mooring posts, and piles of wharfs and jetties.

“ In clear running ditches, the plants and stones have often long streamers of yellowish brown slimy matter attached to them, which is generally diatomaceous.

“ When found in large quantities on the mud, the layer is often covered with bead-like bubbles of oxygen. This often detaches them from the bottom and buoys them to the surface, where they form a dense brown scum, which is blown to leeward in large quantities, and presents the general appearance of dark-coloured yeast.

“ In this form it may be collected in abundance, often quite free from particles of sand and other impurities.

“ Good and rare species have been obtained from the stomachs of oysters, scallops and other shell-fish inhabiting deep water.

“ The sea-cucumbers (*Holothuridæ*) found so frequently in southern latitudes, ought to contain many species.

“ These animals might be simply dried and preserved just as found, and the contents of the stomach afterwards obtained by dissection.

“The Noctilucae, which cause the phosphorescence in the sea, are diatom-feeders, and may be caught in large quantities in a fine gauze towing-net.

“The Ascidians, found attached to oyster shells and stones from deep water, have yielded excellent gatherings.

“The Salpæ, often noticed in warm latitudes floating on the surface of the sea, and assuming chain and other like forms, ought to be bottled up for examination. These Salpæ are well-known diatom-feeders.

“Deep sea soundings ought to be preserved, especially from great depths, and are often exclusively diatomaceous. Seaweed from rocks ought to be preserved, especially the smaller species, and if covered with a brown furriness, so much the better.

“Very rare species have been found in immense quantities in the Arctic and Atlantic regions, by melting the ‘*pancake ice*,’ which is often found discoloured of a brown tint in consequence of the great numbers of these minute beings.

“The sea is often observed to be discoloured by brownish patches. The discoloured water (or ‘*spawen*,’ as it is called) should be collected, filtered through cotton-wool, and the brown residue preserved.

“When a fine impalpable dust is observed to be falling at sea, it ought to be collected from the folded sails and other places where it lodges. This may yield Diatomaceæ which, from the method of collecting, would be highly interesting to examine.

“The roots of the various species of Mangrove (*Rhizophora*) which form impenetrable barriers along the salt-water rivers and estuaries in the tropical parts of Africa, Australia, the Eastern Archipelago, &c., are found frequently covered with a brown mucous slime, said to be very rich in Diatomaceæ.

“When the Diatomaceæ are collected from any of the above-mentioned sources they may be at once transferred to

small bottles, or the deposit may be partially dried and wrapped up in pieces of paper or tinfoil. When placed in bottles, a few drops of spirits added will keep them sweet.

“In all cases it is essential to keep the gatherings separate and distinct, and that the locality whence obtained be written on each package.

“All shells and stones from deep water which are covered with sea-weed ought to be preserved, as affording interesting and little known species. The rougher these are the better, and on no account ought they to be washed.”

Soundings (especially if brought up with *soap* instead of *fatty matter*) may very readily be preserved by sticking them on to pieces of paper, with a memorandum of the date, depth, and latitude and longitude, &c. Ordinary envelopes will answer very well for the purpose, as the soundings when dry may be put either on the inner side of the envelope or be attached to a separate piece of paper and slipped in like a letter.

The sea-cucumbers, ascidians, salpæ, &c., mentioned above, should be assiduously collected *for their own sake*, as well as for the reasons here given.

TRAWLING AND DREDGING.

In water not too deep for the use of a trawl, large numbers of marine animals of all kinds, fish, crustacea, shells, starfish, &c., &c., may be most readily obtained. Large collections may be made in a short time and with little trouble. Trawling is therefore strongly recommended.

For procuring small specimens, such as would escape through the wide meshes of the trawl, *a dredge is most desirable*. Indeed for deep water this only is available for collecting ground specimens. Dredging is therefore also most strongly recommended.

Dredges may be procured in Liverpool of Mr. Edmondson, Basnett Street, or of Mr. Finchett, Button Street, White-

chapel; and in London of Mr. Highley, 74, Dean Street, Soho.*

As the special object in dredging is to procure specimens from the sea-bottom, a quantity of mud and sand is often brought up. A small brass sieve is therefore requisite, by which to sift the minute specimens from the mud, &c., by pouring water through the sieve. The specimens so obtained may be put into small bottles of spirit and labelled with the depth in fathoms from which obtained, nature of the sea bottom, and lat. and long., as before directed.

Where the sea-bed is covered with coral, large masses may be detached by means of a strong drag-hook, and many living creatures may be found sheltered and hiding between the branches. These should be carefully extracted, put in bottles of spirits, and labelled accordingly.

Whenever opportunities occur of examining the *sea-beach* and the shores of tidal rivers, they should be made the most of. Proceeding thither as the tide goes out, and working gradually down to extreme low water-mark, a great variety of specimens may be obtained which are not to be procured either by trawling or dredging, as different depths of the sea bottom have their own peculiar kinds of living creatures. All stones and pieces of rock that it is possible to move should be turned over, as creatures of all kinds either attach themselves to the under side, or bury in the sand or mud beneath. Wherever there is any depression in the sand, &c., some living creature is probably buried beneath; but, as many of them burrow very rapidly or already have deep holes excavated into which to retreat on the first symptom of danger, considerable dexterity and quickness are necessary to secure them.

* It is difficult to give instructions for making a dredge without having a wood-cut illustration to refer to. Those who may not be able to procure one ready-made will find a good figure and description in Woodward's "Manual of the Mollusca," (before referred to) at pages 428 and 429, together with other information most useful to dredgers, and one or more dredges can always be seen at the Liverpool Free Public Museum.

All possible search should be made as the tide recedes, and the lower it falls the richer and rarer will the harvest of specimens generally be. Wrack, and sea-weed of all kinds, should be examined for specimens lurking therein. A basket with wide-mouthed bottles, and a spade to dig for the animals which burrow, are necessary accompaniments when hunting the shore and beach.

SPIRIT SPECIMENS.

As repeatedly mentioned in the preceding pages, it is extremely desirable, at least once, to change the spirit in all bottles, jars, &c., in which specimens are preserved, in order to make good the loss by absorption and evaporation. Considerable care is requisite in finally fastening up the bottles, as bungs in particular are often made of inferior cork. The following method is recommended by Mr. Wm. Stimpson, late naturalist to the United States' Expedition to the North Pacific Ocean, as having been adopted for all his smaller vessels with eminent success. Take some ordinary calico or linen, soak it in common bees' wax melted by the fire, and let it dry. Cut from this a circular piece, put it over the mouth of the bottle, and drive it in tight with the cork or bung. Cut a larger piece, and tie it tightly over the cork *and the head of the bottle*. The wax will adhere sufficiently to prevent any further escape of spirit. The same gentleman also recommends the use of plaster of Paris for effectually closing large jars. Some kind of lid or cover is necessary, but upon this a little plaster of Paris, mixed with water, may be easily run, and it will dry immediately and form a perfectly air-tight covering. Care of course should be taken to prevent it getting in among the specimens.

Glass bottles containing spirit specimens may be easily and safely packed by wrapping them well with hay or other soft material, and then in paper. In this manner they can be stowed away (corks uppermost) in a box or chest without fear of damage.

AQUARIA.

The establishment of an Aquarium on board ship may appear at first sight to be difficult or impossible. Really it is not so, at least on a small scale. Glass globes, such as are ordinarily used for gold-fish, answer very well for this purpose. Take a circular piece of wood an inch thick ; to this attach four small cords of twelve or fourteen inches long, bind their loose ends to a metal eye, place a globe on this stand within the four cords, hang it to a hook in the cabin ceiling, and it will swing as safely as a lamp. In this way globes of the kind above-named, containing living specimens, have been conveyed four times across the Atlantic by Capt. Mortimer in the ship "Florida," without being broken or damaged. A double object may be attained by the establishment of small aquaria of this kind : they afford the opportunity of closely studying various interesting living objects, and of importing them to England.

With the multitude of ships and steamers constantly arriving in our ports, and the quickness of their passage as compared with former times, it is not a little surprising that so few living exotic creatures have been imported by this method, either for purposes of naturalization or to supply the demand for interesting specimens for aquaria.

One or two hints may be useful to those disposed to make an attempt. *Never try to bring more than two or three specimens, and these of small size, in a single globe.* Three fish as large as minnows would be quite as many as could live long together in such limited space. Hang the globe in the coolest part of the vessel, in a shady place. Strong light and warmth are very prejudicial. Draw off with a clean siphon, or other means, a portion of the water, daily if possible, and supply its place with more. A little fine sand, washed free from anything that will obscure the water, may in the outset be put in the bottom of the globe, or, instead of sand, a little

extremely fine shingle may be used. This affords opportunities for groping and hiding which many creatures indulge in.

The floating shell-fish of the ocean, shell-fish of other kinds, small crabs, &c. ; and small specimens of the numberless, beautiful species of fish, beside more minute objects, would afford ample material for study, and would be received with delight in England.

To import *large* specimens it will be necessary to keep them in a bucket, or barrel, with plenty of air playing over it, a daily change of water, and a shady situation.

Frequent change of a portion, at least, of the water in the globe aquaria will generally afford sufficient nutrition for their occupants. If, however, feeding should be necessary, a minute crumb or two of ship-biscuit may be dropped in the water occasionally, for fishes. For crabs, prawns, &c., a tiny piece of fish may be placed in the water for half an hour ; but on no account should food of any kind be allowed to remain, as it will contaminate the water more than any other cause. Specimens that may die in the aquaria should, for the same reason, be immediately removed. The best criterion of the well-doing of an aquarium is the state of the water. If this, when undisturbed, is quite clear, all is as it should be. If it be at all obscure or discolored, it should be immediately changed.

METHOD FOR COLLECTING AND STUDYING DESIRABLE.

In order to make the most profitable use of such time and labour as may be expended upon the subjects referred to in these pages, it is strongly recommended to those who are at all earnest in the matter, *to determine upon some method of conducting their researches*. It is not to be expected that any persons will attempt to study deeply or collect largely, all the classes of animals that have been here referred to. Some more restricted plan will be generally necessary ; and it will

be better, probably, in every way, that the attention should be directed chiefly to one branch of the subject; though not necessarily to the entire exclusion of all others. For instance, fish may be made the principal object of attention. Whatever time may be available for scientific pursuits, may be devoted chiefly to the capture and study of this class of animals. All those met with on any one voyage, may be noted, information obtained relating to them, and possibly several specimens preserved. A list may be made out towards the end of the voyage; and the notes copied, with references given to such specimens as have been obtained. If the names are not known, they can be referred to by numbers. Search might be made, while at home, in Natural History books in public or private libraries, to obtain the scientific names, and to learn what is already recorded about them; the assistance of some naturalist may be obtained, or the paper, as it is, might be submitted to some Natural History society; if in Liverpool, to the *Literary and Philosophical Society*. Or the sailor student, if sailing again, or continually to the same port, may continue his observations and add to his notes and his specimens; or even if sailing to other countries, the same class of animals may continue to be the objects of his attention.

By such means as the above, he is certain, sooner or later, to accumulate valuable knowledge, which, if published, can scarcely fail to aid in the furtherance of science; and to lead him to do this is the great object for which this paper is prepared.

Another method may be suggested. A captain trading regularly to one port may very properly extend his observations to many or all the classes of animals to be met with in his repeated voyages; and in time his list of specimens observed and captured, and his notes thereon, cannot fail to be of interest to naturalists.

In fact those scientific publications which are devoted to the furtherance of Natural History, contain a large proportion of papers such as would result from either of the above methods.

The pleasure which is invariably experienced in the study of natural objects would be considerably increased by such methodical working. When a man is able to add a fresh species to his list, it is done with no small amount of satisfaction; and the monotony of a dull voyage cannot but be considerably relieved by such an occurrence. Moreover in comparing the list of his own captures in any particular class of animals, with the published lists of species known to exist, he will not fail to find in it many deficiencies. This will lead him to search more carefully, in order to obtain the species that are wanting; and he will probably succeed in obtaining many which otherwise he would never have met with. In all probability a few will still be lacking, and he will be led to take a deeper interest in studying the distribution of species, the limits of their range, and the conditions essential to their existence. No more appropriate or more interesting subject of research can be taken up by the Mercantile Marine.

USEFUL ELEMENTARY BOOKS.

“The Animal Kingdom” of Baron Cuvier. Edited by Dr. Carpenter and J. O. Westwood, Esq. Orr and Co., London, 1854. 1 vol., large octavo, £1 1s.

This work contains a general and connected account of all classes of the animal kingdom.

“The Pictorial Museum of Animated Nature.” Cox, London. 2 vols., folio, £1 16s.

This work contains nearly 4,000 woodcuts, which alone would suffice approximately to name large numbers of animals, whether vertebrate or invertebrate.

“The English Cyclopædia.” By Charles Knight. *Natural History Division*. 4 vols., price £2. Bradbury and Evans, London, 1854—1856.

This goes more fully into the scientific characters and groups

of animals than either of the above. It is a most useful and valuable work.

Woodward's "Manual of the Mollusca." Weale, London, 1856. 1 vol., 12mo. Indispensable to all collectors of shells. Price 6s. 6d.

Darwin's "Naturalist's Voyage round the World." Murray, London. 1 vol., 12mo, 9s.,

A charming book, which cannot fail to fascinate and instruct all who read it, and to inculcate habits of observation.

"The Microscope and its Revelations." By W. B. Carpenter, M.D. Churchill, London, 1856. 1 vol. 12mo, 12s. 6d.

Most serviceable to all who use the microscope, and study the objects to which it is applicable.

"Lardner's Cabinet Cyclopædia: Birds," by W. Swainson. 2 vols. 9s. "Fishes, Amphibians, and Reptiles," by the same. 2 vols. 9s.

These volumes will be found very useful for the particular subjects on which they treat; though the writer's *theory of arrangement* has few followers. For the most generally adopted arrangement of fish, see

"Encyclopædia Britannica," 8th edition, vol 12, 1856, article Ichthyology. The two parts containing this can be had for 12s.

"Natural History of the European Seas." By Messrs. Edward Forbes and Godwin-Austen. Van Voorst, London, 1859. 12mo, 6s.

A suggestive book for Mediterranean voyagers.

AIDS FOR COLLECTING.

The following simple outfit will enable any one to make large collections of specimens:—

A dredge.

A towing net.

Glass bottles, such as empty pickle and preserve bottles; the wider in the mouth the better.

Smaller glass bottles, such as homœopathic bottles, or bottles of similar size, made out of glass tubing, and fitted with corks.

One or two pairs of small forceps, for picking up minute objects.

Pill boxes of various sizes.

A good supply of spirit.*

Ditto salt.

Alum will also be useful for large skins.

Arsenical soap, 3 or 4lbs., for skins of quadrupeds, birds, reptiles, and fish.

Bees-wax, calico, and plaster of Paris.

A pocket lens, for examining small objects.

A small microscope would be a most useful addition, well repaying the cost, by the greater power it gives of examining the most minute specimens.

Bottles made from glass tubing are exceedingly serviceable for the isolation and preservation of small specimens. They may be had of Mr. Evans, Cleveland square, Liverpool. Very neat bottles, of a larger range of sizes, are made from glass tubing expressly for naturalists, by Mr. Wadsworth, 17, Upperhead row, Leeds, and will be found extremely useful.

Pill and chip boxes may be procured from Mr. Jackson, dealer in druggists' sundries, Cleveland square, Liverpool.

RECIPE FOR ARSENICAL SOAP.

| | |
|------------------------------|-----------|
| Camphor | 5 ounces |
| Arsenic, in powder | 2 pounds |
| White soap | 2 pounds |
| Salts of Tartar | 12 ounces |
| Lime, in powder | 4 ounces |

Cut the soap in thin small slices, as thin as possible; put them in a pot over a gentle fire, with very little water, taking care to stir it often with a wooden spoon: when it is well melted, put in the salts of tartar and powdered chalk. Take it off the fire, add the arsenic, and triturate the whole gently. Lastly, put in the camphor, which must first be reduced to powder in a mortar, by the help of a little spirits of wine; mix the whole well together. This paste ought then to have the consistence of flour paste. Put it into glazed earthen pots,

* Methylated spirit, of full strength, answering every purpose, may be purchased, free of duty, at certain druggist's and other shops, at a cost of about 4s. to 5s. per gallon.

taking care to put a ticket on each, labelled "POISON." The three first ingredients in the above recipe may be used if the others cannot readily be obtained.

When it is to be used, put the necessary quantity into a preserve pot, dilute it with a little cold water, or, better still, with spirit, rub it with a small brush until it has the consistence of cream ; cover this pot with a lid of pasteboard, in the middle of which bore a hole for the handle of the brush.

This preparation is the most generally used for the preservation of skins of quadrupeds, birds, reptiles, and fish, and is to be freely applied with the brush, immediately after skinning, on the fleshy side of the skin. As it is a troublesome and unpleasant task to make up the prescription, it is advisable to get it done by some trustworthy druggist.

ADDITIONS TO THE LIBRARY,

RECEIVED FROM MAY, 1861, TO MAY, 1862.

| | Title. | Donor. |
|--------------|---|-----------------------------------|
| 1861. | | |
| OCTOBER 7th. | | |
| | Greenwich Astronomical Observations (Airy's), from 1836 to 1847, 12 vols. 4to. | |
| | Greenwich Magnetic and Meteorological Obser- vations (Airy's), 1840-1847, 7 vols. 4to. | |
| | Greenwich Astronomical, and Magnetic and Meteorological Observations (Airy's), 1847-1858, 11 vols. 4to. | |
| | Maskelyne's Observations, 1765-1786, 2 vols. 4to. | |
| | Reduction of Greenwich observations of the Moon, 1750-1851, 3 vols. 4to. | |
| | Reduction of Greenwich Observations of Planets, 1750-1830, 1 vol. 4to. | |
| | | <i>From the Astronomer Royal.</i> |
| | Transactions of the Royal Irish Academy, from the commencement, 7 vols. | <i>The Academy.</i> |
| | Proceedings of the Zoological Society, 1860-1861 | <i>The Society.</i> |
| | Journal of the Statistical Society, June, 1861 | <i>The Society.</i> |
| | Ceremonies of the Opening of the Liverpool Free Public Library and Museum | <i>The Town Council.</i> |
| | The Flora and Fauna of the County of Cork Cork Cuvierian Society. | |
| | Journal of the Linnæan Society, No. 20, and Sup- plement to vol. 5 (Botany) | <i>The Linnæan Society.</i> |
| | Proceedings of the Liverpool Philomathic Society | <i>The Society.</i> |
| | Transactions of the 'Tyneside Naturalists' Field Club, vol. 5, part 1 | <i>The Club.</i> |
| | Transactions of the Royal Society of Literature, vol. 7, part 1 | <i>The Society.</i> |

| Title. | Donor. |
|--|-------------------------|
| Monthly Notices of the Royal Astronomical Society, Nos. 6-8 | <i>The Society.</i> |
| Twenty-eighth Annual Report of the Royal Corn- wall Polytechnic Society | <i>The Society.</i> |
| Fifth Annual Report of the Birkenhead Free Public Library | |
| Twenty-fifth Annual Report of the Warwickshire Natural History Society | <i>The Society.</i> |
| Annual Report of the Plymouth Institution, 1860 | <i>The Institution.</i> |
| Journal of the Society of Arts, May to September | <i>The Society.</i> |
| Journal of the Royal Asiatic Society, vols. 18 and 19 | <i>The Society.</i> |
| Proceedings of the Entomological Society, 1859-60 | <i>The Society.</i> |
| Memoires de l'Academie des Sc. Nat. de Cher- bourg, 1859 | <i>The Society.</i> |
| Schriften der Königl. Physicalisch-Okonomischen Gesellschaft zu Königsberg, parts 1 and 2 | <i>The Society.</i> |
| Quarterly Journal of the Geological Society, Nos. 65, 66, 67 | <i>The Society.</i> |
| Quarterly Journal of the Chemical Society, Nos. 48-53 | <i>The Society.</i> |
| Journal of the Franklin Institute of Philadelphia, Nos. 424-429 | <i>The Society.</i> |
| Proceedings of the Royal Society, Nos. 44 and 45 | <i>The Society.</i> |
| Proceedings of the Academy of Natural Sciences of Philadelphia, 1861 | <i>The Academy.</i> |
| Journal of the Royal Geographical Society, 1861, vol. 5 | <i>The Society.</i> |

OCTOBER 21st.

| | |
|---|-----------------------|
| Proceedings of the Royal Institution of Great Britain, part 11 | <i>The Institute.</i> |
| Journal of the Society of Arts. Oct. 11th and 18th | <i>The Society.</i> |
| Remarks and Suggestions on Madhouses in Eng- land, by H. Brimfield | <i>The Author.</i> |

| Title. | Donor. |
|---|---------------------------------|
| On the Meteorology of Scarlet Fever, and on the Influence of Atmospheric Changes on Disease, by G. Vernon | <i>The Author.</i> |
| On Heat in its Relations to Water and Steam, by C. Wye Williams, A.I.C.E. | <i>The Author.</i> |
| Essays on Various Subjects, by Dr. Collingwood | <i>The Author.</i> |
| Proceedings of the Chester Architectural Society, parts 4, 5, and 6 | <i>The Society.</i> |
| Proceedings of the Royal Society, No. 46 | <i>The Society.</i> |
| Smithsonian Contributions to Knowledge, consisting of— | |
| Meteorological Observations made at Providence, R. I., 1831-1860 | <i>Smithsonian Institution.</i> |
| Meteorological Observations made at Washington, Arkansas, 1849-60 | <i>do.</i> |
| On the Fluctuations of Level in the North American Lakes | <i>do.</i> |
| Researches on the Venom of the Rattlesnake, by Dr. Mitchell | <i>do.</i> |
| Smithsonian Report for 1859 | <i>do.</i> |
| Proceedings of the Boston Nat. Hist. Society | <i>The Society.</i> |
| Annals of the Lyceum of Nat. History of New York, 1859-60 | <i>The Lyceum.</i> |
| Second Geological Survey of Arkansas | <i>Smithsonian Institution.</i> |
| Greenwich Observations for 1859 | <i>The Astronomer Royal.</i> |
| Ford's Greenwich Observations from 1829-35, 19 parts, 4to. | <i>do.</i> |
| Eiffe and Molyneux's Improvements in Chronometers | <i>do.</i> |
| Miss Caroline Herschel's Catalogue of Stars, 1 vol. fol. | <i>do.</i> |

NOVEMBER 4th.

| | |
|--|---------------------|
| Journal of the Soc. of Arts, Oct. 25th and Nov. 1 | <i>The Society.</i> |
| Monthly Notices of the Roy. Astronomical Society, Supplement, vol. 29, No. 9 | <i>The Society.</i> |
| Journal of the Linnæan Society, No. 21 | <i>The Society.</i> |

| Title. | Donor. |
|---|---------------------|
| Quarterly Report of the Meteorological Society of Scotland, 1860-61 | <i>The Society.</i> |
| Annual Report of the Leeds Literary and Philoso- phical Society, 1860-61 | <i>The Society.</i> |
| Report of the Geological Society of the West Riding of Yorkshire, 1861 | <i>The Society.</i> |
| Report of the British Association, Oxford, 1860 . | <i>Dr. Inman.</i> |

NOVEMBER 18th.

| | |
|---|-----------------------|
| Journal of the Society of Arts, Nov. 8th and 15th | <i>The Society.</i> |
| Quarterly Journal of the Geological Society, No. 68 | <i>The Society.</i> |
| Transactions of the Botanical Society of Edin- burgh, vol. 7, part 1 | <i>The Society.</i> |
| Journal of the Franklin Institute of Philadelphia, No. 430 | <i>The Institute.</i> |
| Proceedings of the Academy of Natural Sciences of Philadelphia. | <i>The Academy.</i> |
| The Past Year : an Address to the Philomathic Society, by A. Baruchson | <i>The Author.</i> |
| Sketch of the Studies of the Medical Student, by Professor Bentley | <i>The Author.</i> |

DECEMBER 2nd.

| | |
|---|---------------------|
| Proceedings of the Royal Geographical Society, vol. 5, part 5 | <i>The Society.</i> |
| Journal of the Society of Arts, Nov. 23 and 30 . | <i>The Society.</i> |
| Proceedings of the Philosophical Society of Glas- gow (from the commencement), 5 vols. | <i>The Society.</i> |
| Papers on Ozone, by M. Hozeau | <i>The Author.</i> |

DECEMBER 16th.

| | |
|---|-----------------------|
| Journal of the Society of Arts, Dec. 6th and 13th | <i>The Society.</i> |
| Journal of the Franklin Institute, No. 431 . | <i>The Institute.</i> |
| Monthly Notices of the Roy. Astronomical Society, vol. 24, part 4 | <i>The Society.</i> |
| On the Vestiges of Extinct Glaciers in the High- lands, by E. Hull, F.G.S. | <i>The Author.</i> |

Title.

Donor.

JANUARY 13th.

Report of the Regents on the Cabinet of Natural
History, State of New York, for 1859-60-61 .

Report of the Regents on the State Library,
1860-61

Report of the Regents on Colleges and Academies,
1860-61

Guide to the Geology of New York

From the New York State Library.

Journal of the Royal Asiatic Society, vol. xix.,
part 2

The Society.

Journal of the Society of Arts, from Dec. 20th . *The Society.*

Annual Report of the Peel-park Library

Journal of the Franklin Institute of Philadelphia,
No. 432

The Institute.

Medico-Chirurgical Transactions, vol. xlv . . . *The Society.*

Transactions of the Royal Scottish Academy of
Arts, vol. 6, part 1

The Academy.

Canadian Journal of Industry, No. 36, N.S. *Canadian Institute.*

The Theory of Groups and many varied Func-
tions, by the Rev. T. P. Kirkman

The Author.

JANUARY 27th.

Journal of the Geological Society of Dublin, vol.
9, part 1

The Society.

Monthly Notice of the Roy. Astronomical Society,
vol. 22, part 2

The Society.

Journal of the Society of Arts, Jan. 17th and 24th *The Society.*

FEBRUARY 10th.

Proceedings of the Archæological and Architec-
tural Society of Liverpool, 1860-61

The Society.

Journal of the Society of Arts, Jan. 31 & Feb. 7th *The Society.*

Proceedings of the Royal Geographical Society,
vol. 6, No. 1

The Society.

Quarterly Report of the Meteorological Society of
Scotland, Sept., 1861

The Society.

| Title. | Donor. |
|---|---------------------|
| Journal of the Royal Dublin Society, No. 20-23 | <i>The Society.</i> |
| Proceedings of the Royal Society, vol. 2, No. 47 | <i>The Society.</i> |
| Proceedings of the Royal Society of Edinburgh, 1860-61 | <i>The Society.</i> |
| Transactions of the Tyneside Naturalists' Field Club, vol. 5, part 2 | <i>The Club.</i> |

FEBRUARY 24th.

| | |
|---|-----------------------|
| A Treatise on Insects Injurious to Vegetation, by Dr. Harris, &c. (State of Mass.) | <i>Prof. Agassiz.</i> |
| Monthly Notices of the Royal Astronomical Society, vol. 22, part 3 | <i>The Society.</i> |
| Journal of the Franklin Institute, No. 433 | <i>The Institute.</i> |
| Journal of the Society of Arts, February 14th and 21st | <i>The Society.</i> |
| Annals of the Lyceum of Nat. Hist., New York | <i>The Lyceum.</i> |
| Transactions of the Ethnological Society of London, vol. 2, 3, 4, and N.S., vol. 1 | <i>The Society.</i> |

MARCH 10th.

| | |
|--|---------------------|
| Journal of the Society of Arts, Feb. 28th and March 7th | <i>The Society.</i> |
|--|---------------------|

MARCH 24th.

| | |
|---|--------------------------------|
| Report of the Compass Committee, 1857-61 | <i>The Committee.</i> |
| Monthly Notices of the Royal Astronomical Society, Feb. 14th | <i>The Society.</i> |
| Journal of the Society of Arts, Mar. 14th and 21st | <i>The Society.</i> |
| Canadian Journal of Industry, No. 37 | <i>The Canadian Institute.</i> |
| Journal of the Franklin Institute, No. 434 | <i>The Institute.</i> |
| Journal of the Statistical Society of London, March, 1862 | <i>The Society.</i> |

APRIL 7th.

| | |
|---|-----------------------|
| Observation on Temperature, in connection with Vegetation, by Profesor Balfour | <i>The Author.</i> |
| Journal of the Franklin Institute, No. 438 | <i>The Institute.</i> |
| Proceedings of the Academy of Sciences of Phila- delphia | <i>The Academy.</i> |

| Title. | Donor. |
|--|---------------------|
| Journal of the Society of Arts, March 28th and | |
| April 4th | <i>The Society.</i> |
| Address of W. Rathbone, Esq., to the Roy. Institution, | |
| | <i>The Author.</i> |

APRIL 21st.

| | |
|---|---------------------|
| Journal of the Society of Arts, April 12th . | <i>The Society.</i> |
| Silliman's American Journal, Nos. 97 and 98 | <i>The Editor.</i> |
| Proceedings of the Berwick Naturalists' Club, 1861. | <i>The Club.</i> |

PROCEEDINGS
OF THE
LITERARY AND PHILOSOPHICAL SOCIETY
OF
LIVERPOOL,
DURING THE
FIFTY-SECOND SESSION, 1862-63.

No. XVII.

LIVERPOOL:
PRINTED FOR THE MEMBERS OF THE SOCIETY,
BY THOMAS BRAKELL, 7, COOK STREET.

1863.

3784

This Volume has been edited by the Hon. Secretary.

The Authors have usually revised their papers.

The Authors alone are responsible for facts and opinions.

**The Society exchanges Proceedings with other publishing bodies,
through the Secretary, from whom back numbers may be obtained.**

CONTENTS.

| | PAGE |
|--|------|
| COUNCIL | v |
| LIST OF MEMBERS | v |
| —— HONORARY MEMBERS | xiii |
| —— ASSOCIATES | xv |
| BALANCE SHEET | xvi |
| ANNUAL MEETING—Report | 1 |
| Valedictory Address of retiring President..... | 8 |
| FIRST ORDINARY MEETING | 11 |
| President's Inaugural Address | 13 |
| SECOND ORDINARY MEETING | 26 |
| Rev. H. S. Byrth—"An Examination of Mr. Mill's Theory of the Character and Proof of Mathematical Doctrines" (abstract) | 27 |
| THIRD ORDINARY MEETING | |
| E. J. Reed, Sec. I. N. A.—"On Armour-plated Ships of War" | 29 |
| Rev. A. Hume, D.C.L.—"On the Manufacture of Stone Implements in Ancient and Modern Times" (abstract) | 34 |
| FOURTH ORDINARY MEETING | 36 |
| J. A. Picton, F.S.A.—"On the Ancient Gothic Language, in its relation to the other Indo-European Tongues," part 2..... | 37 |
| FIFTH ORDINARY MEETING | 63 |
| Mr. E. J. Reed—"On Modern Poets and their Poems" | |
| SIXTH ORDINARY MEETING | 65 |
| Andrew Commins, LL.D.—"Right and Wrong" (abstract) | 68 |
| SEVENTH ORDINARY MEETING | 70 |
| J. Birkbeck Nevins, M.D.—"On some New and hitherto unexplained Phenomena exhibited by the Gyroscope" | 71 |

| | PAGE |
|---|------|
| EIGHTH ORDINARY MEETING | 76 |
| William Ihne, Ph.D., President—"Notes on English Grammar" | 78 |
| NINTH ORDINARY MEETING | 101 |
| Dr. Collingwood "On the Ancient Fauna of Lancashire and Cheshire" | 104 |
| TENTH ORDINARY MEETING | 129 |
| Rev. C. D. Ginsburg, LL.D.—"The History of Engraving (abstract) | 130 |
| ELEVENTH ORDINARY MEETING | 139 |
| J. A. Picton, F.S.A.—On the words, "Other, Either, Or, Whether" | 139 |
| H. Duckworth, F.L.S. — "The Arch of Titus" (abstract)..... | 142 |
| TWELFTH ORDINARY MEETING | 147 |
| E. J. Reed, M.I.N.A.—"On a New Theory of the Generation of Steam, with an explanation of the Geysers of Iceland"..... | 148 |
| THIRTEENTH ORDINARY MEETING | 177 |
| Rev. C. D. Ginsburg, LL.D.—"On the Essenes" ... | 181 |

APPENDIX.—Donations received during the Session.

INDEX.

SESSION LII., 1862-63.

President.

WILLIAM IHNE, Ph.D.

Vice-Presidents.

REV. HENRY H. HIGGINS, M.A., Cantab.

J. BIRKBECK NEVINS, M.D., Lond.

REV. JOHN ROBBERDS, B.A., Lond.

Treasurer.

ISAAC BYERLEY, F.L.S., F.R.C.S.

Hon. Secretary.

CUTHBERT COLLINGWOOD, M.A. & M.B., Oxon, F.L.S., &c.

C O U N C I L .

JOSEPH CARTER REDISH.

CHARLES CLARK.

THOMAS J. MOORE, Cor. Mem.Z.S.

REV. CHR. D. GINSBURG, LL.D.

JAMES A. PICTON, F.S.A.

HENRY S. EVANS, F.C.S.

PHILIP H. RATHBONE.

ARNOLD BARUCHSON.

ALFRED HIGGINSON, M.R.C.S.

ORDINARY MEMBERS,

ON THE SOCIETY'S ROLL AT THE CLOSE OF THE 52ND SESSION.

Those marked + are Original Members of the Society.

Life Members are marked with an asterisk.

Jan. 26, 1863 Abbott, Joseph, B.A., *Collegiate Institution*, and 73, *Spencer-street, Everton.*

Oct. 11, 1833 Aikin, James, 2, *Drury-lane*, and 4, *Gambier-terrace.*

Dec. 10, 1860 Alexander, James, 8, *York buildings, Dale-street*, and 24, *Bedford-street South.*

Jan. 8, 1861 Anderson, David, 5, *Castle-street*, and 7, *Church-street, Egremont.*

Dec. 11, 1854 Andrew, John, *Fenwick chambers*, and *Sandown-park, Wavertree.*

*Nov. 28, 1853 Archer, Professor, F.R.S.E., F.R.S.S.A., Director of the Industrial Museum of Scotland, *Edinburgh.*

Feb. 22, 1855 Avison, Thomas, F.S.A., 18, *Cook-street*, and *Fulwood-park, Aigburth.*

- Dec. 10, 1860 Baar, Rev. Hermann, Ph. D., 15, *Sandon-street*.
 May 1, 1854 Bahr, G.W., 4, *Cable st.* and 2, *South-hill Grove, Aigburth*.
 Dec. 15, 1862 Balman, Thomas, M.D., 6, *Bedford-street South*.
 Oct. 29, 1860 Banister, Rev. W., B.A., *St. James's Mount*.
 Jan. 13, 1862 Baruchson, Arnold, 35, *Dale-street*, and *Blundell-sands, Great Crosby*.
 Nov. 3, 1862 Behrend, Saml. H., M.A., 24, *Clarendon-rooms*, and 15, *Canning-street*.
 Mar. 9, 1857 Bell, Christopher, *Moor-st.*, & 60, *Bridge st., Birkenhead*.
 Feb. 6, 1854 Bennett, William, *St. George's-place, Lime-street*, and 109, *Shaw-street*.
 Oct. 31, 1859 Birch, James, 13, *Rumford-place*, and 7, *Upper Baker-st.*
 April 15, 1861 Blake James, 63, *Kitchen-street*, and 45, *Canning-street*.
 Oct. 31, 1859 Bloxam, Frederick William, *Alliance Bank, Brown's-buildings*, and 157, *Islington*.
 Jan. 12, 1863 Bolton, Ogden, *Prince's-buildings, Harrington-street*, and 10, *Great George-square*.
 *Mar. 6, 1835 Boulton, Swinton, 1, *Dale-street*, and 3, *Bedford-street South*.
 Nov. 13, 1854 Bretherton Edward, F.G.S., 21, *Harrington-street*, and 47, *Hamilton-square, Birkenhead*.
 Oct. 21, 1844 Bright, Samuel, 1, *North John-street*, and *Sandheys, Mill-lane, West Derby*.
 *Jan. 8, 1855 Brockholes, James Fitzherbert, *Puddington Old Hall, near Neston*.
 Dec. 2, 1861 Browne, G. Mansfield, 15, *Fenwick street*, and 15, *South-hill-road, Toxteth-park*.
 April 21, 1862 Bulley, Samuel, *Peter's-place, Rumford-street*, and *East Lodge, Prince's-park*.
 May 8, 1857 Burton, Rev. Charles Henry, M.A., 1, *Sandon-terrace*.
 Mar. 9, 1863 Buxton, David, F.R.S.L., Principal of the School for the Deaf and Dumb, 52, *Oxford-street*.
 *May 1, 1848 Byerley, Isaac, F.L.S., F.R.C.S., *Victoria-road, Seacombe*.
 TREASURER.

- Feb. 23, 1863 Callon, W. J., M.D., 125, *Islington*.
 Nov. 3, 1862 Cameron, John, M.D., M.R.C.P., Physician to the Southern Hospital, and Lecturer on Medicine at Royal Inf. Sch. of Med., 17, *Rodney-street*.
 April 7, 1862 Campbell, John, *Liverpool and London-chambers*, and *Oak House, Aigburth-hall road*.

- April 7, 1862 Cawkitt, James M., 28, *Chapel street*, and 23, *Queen's road, Everton*.
- Dec. 2, 1851 Chadburn, William, 71, *Lord-street*.
- Dec. 1, 1851 Clare, John Leigh, 11, *Exchange-buildings*, and 22, *Richmond-terrace, Everton*.
- Oct. 31, 1859 Clark, Charles, 17, *North John-st.*, and *Linden Cottage, Rock Ferry*.
- Jan. 26, 1857 Clay, William, 97, *Sefton-street*, and 4, *Parkhill-road*.
- May 31, 1858 Collingwood, Cuthbert, M.A., M.B., Oxon, M.R.C.P., F.L.S., Lect. on Botany, Royal Infirmary Sch. of Med ; Phys. to the Northern Hospital, 15, *Oxford-street*. HON. SECRETARY.
- Jan. 26, 1863 Commins, Andrew, LL.D. Dub., *Clarendon-chambers, 1, South John-street*.
- Jan. 22, 1850 Cox, Henry, 19, *Brunswick street*, and *Poplar-rd., Oxton*.
- Jan. 12, 1863 Cros, Jean Baptiste, 69, *Bold-street*, and 8, *Oxford-street*.
- Oct. 6, 1862 Crosfield, William, Jun., 28, *Temple-street*, and 11A, *Rake-lane*.
- Jan. 26, 1857 Dadabhai Naoroji, Professor of Gujarati, London University, 32, *Great St. Helen's, London, E.O.*
- *April 6, 1840 Dickinson, Joseph, M.A., M.D. Dub., F.R.C.P., F.R.S., M.R.I.A., F.L.S., 92, *Bedford-street South*.
- Nov. 27, 1848 Dove, Percy Matthew, F.S.S., 1, *North John-street*, and *Claughton*.
- Jan. 23, 1848 Drysdale, John James, M.D., Edin., M.R.C.S., Edin. 44, *Rodney-street*.
- Feb. 4, 1856 Duckworth, Henry, F.L.S., F.R.G.S., F.G.S., 5, *Cook-street*, and 2, *Gambier-terrace*.
- *Nov. 27, 1848 Edwards, John Baker, Ph.D. Gies., F.C.S., Lect. on Chemistry, Liverpool Royal Infirmary Sch. of Med., *Royal Institution Laboratory*, and *Waterloo*.
- Mar. 10, 1862 Ellison, Christopher O., 20, *Clayton-square*, and 29, *Falkner-street*.
- April 7, 1862 English, Charles J., 26, *Chapel-street*, and 26, *Falkner-sq.*
- Nov. 18, 1850 Evans, Henry Sudgen, F.C.S., 52, *Hanover-street*, and *Rainhill*.
- Feb. 24, 1862 Ewer, Harry Alexander, 21, *Harrington-street*, and 57, *Canning-street*.

- April, 30, 1860 Fabert, John Otto William, 1, *Parliament-street*, and 8, *St. James's Mount*.
- *Dec. 14, 1846 Faram, John, 8, *Railway Cottages, Edge Hill*, and *Lime-street Railway Station*.
- *Dec. 13, 1852 Ferguson, William, F.L.S., F.G.S., 2, *St. Aidan's-terrace, Birkenhead*.
- Feb. 9, 1863 Finlay, William, Senior Mathematical Master, Middle School, *Collegiate Institution*, and 49, *Everton-road*.
- *April 3, 1837 Fletcher, Edward, 4, *India-buildings*, and 31, *High Park-street*.
- *Mar. 19, 1855 Foard, James Thomas, 12, *Salisbury-street, Strand, London*.
- *Feb. 6, 1854 Gee, Robert, M.D. Heidelb. M.R.C.P., Lect. on Patholog. Anat. Royal Infirmary Sch. of Med.; Physician, Workhouse Hospital; 10, *Oxford-street*.
- Feb. 9, 1863 Giles, Rev. Edward, *Huyton-park, Huyton*.
- March 4, 1861 Ginsburg, Rev. Christian D., LL.D. Glasg., 10, *Rake-lane*.
- Dec. 2, 1861 Graves, Samuel R., *Baltic-buildings*, and *The Grange, Wavertree*.
- Jan. 26, 1863 Green, Rev. W. C., M.A., *Collegiate Institution*.
- Nov. 14, 1853 Greenwood, Henry, 32, *Castle-st.*, and *Roseville, Huyton*.
- Nov. 30, 1857 Grimmer, William Henry, 15, *Cable-st.*, and 64, *Grove-st.*
- Jan. 22, 1855 Hakes, James, M.R.C.S., Surgeon to the Northern Hospital, *Hope-street*.
- Dec. 1, 1862 Hakes, Thomas, 20, *Castle-st.*, and 47, *Dean-st., Edge-lane*.
- Feb. 23, 1863 Hall, Charlton R., 17, *Dale-street*, and *Liscard Castle, Liscard*.
- *Jan. 21, 1856 Hardman, Lawrence, *York-buildings, Sweeting-street*, and *Rock-park, Rock-ferry*.
- Feb. 9, 1863 Hart, Thos. Aubrey, M.A. Oxon, 81, *Bedford-st. South*.
- Jan. 13, 1862 Harvey, Enoch, 12, *Castle-street*, and *Greenheys, Riversdale-road, Aigburth*.
- April 27, 1862 Hausburg, Friedrich Leopold Ludwig, *Rosenfels, Woolton*.
- *Mar. 7, 1842 Heath, Edward, *Orange-court*, 37, *Castle-street*, and *St. Domingo-grove*, 114, *Breckfield-road N., Everton*.
- Dec. 12, 1855 Hess, Ralph, *Albany, Oldhall-street*, and 17, *Upper Duke-street*.

Dec. 28, 1846 Higgins, Rev. H. H., M.A., Cantab., F.C.P.S., *Rainhill*.
VICE-PRESIDENT.

*Oct. 31, 1836 Higginson, Alfred, M.R.C.S., Surg. Southern Hosp.,
44, *Upper Parliament-street*.

Nov. 3, 1862 Highat, Robt., 28, *Chapel-st.*, and *Page Moss Farm, Roby*.

Mar. 4, 1861 Hindley, Rev. H. J., M.A., 3, *Grecian-terrace, Everton*.

Jan. 12, 1857 Holden, E. Erasmus, *Appleton-in-Widnes, Warrington*.

Nov. 13, 1854 Holland, Charles, 17, *Tower-buildings North*, and
Liscard Vale, New Brighton.

Mar. 22, 1847 Horner, Henry P., 2, *Derby-square*, and 5, *Devonshire-*
road, Prince's-park.

Nov. 4, 1850 Howson, Rev. John Saul, D.D. Trin. Col. Cantab., Prin-
cipal of the Collegiate Institution, *Shaw-street*, and
Dingle-park, Dingle-lane.

Dec. 27, 1841 Hume, Rev. Abrah., D.C.L. Dub., LL.D. Glas., F.S.A.,
24, *Clarence-street, Everton*.

*Nov. 13, 1854 Hunter, John, Memb. Hist. Soc. Pennsylvania, *Halifax*,
Nova Scotia.

Jan. 13, 1862 Hutchison, Robert, *Barned-buildings, Sweeting-street*,
and 6, *Canning-street*.

Jan. 26, 1857 Hutton, David, 3, *St. George's Crescent*, and 61, *Canning-*
street.

*Apr. 29, 1850 Ihne, William, Ph.D. Bonn, President of the Philomathic
Society, 316, *Upper Parliament-street*. PRESIDENT.

Feb. 23, 1857 Imlach, Henry, M.D. Edin., 1, *Abercromby-square*.

*Oct. 21, 1844 Inman, Thomas, M.D. London, M.R.C.P., Phys. Royal
Infirmary, 12, *Rodney-street*, and *Spital, Cheshire*.

Mar. 10, 1862 Johnson, Richard, *Queen Insurance-buildings*, and
Brookfield House, Seaforth.

Jan. 26, 1863 Johnson, Richard, jun., *Queen Insurance-buildings*.

Jan. 23, 1854 Jones, John, 28, *Chapel-street*, and 70, *Rodney-street*.

Mar. 9, 1863 Jones, Rev. Joshua, M.A. Oxon, Principal of the Liver-
pool Institute, 59, *Bedford-street South*.

*April 4, 1852 Jones, Morris Charles, *Queen Insurance-buildings*, and
75, *Shaw-street*.

Mar. 23, 1863 Jones, R. D., B.A., T.C.D., *Collegiate Institution*.

May 6, 1851 Jones, Roger Lyon, *Liverpool and London Chambers*,
Exchange, and 6, *Sunnyside, Prince's-park*.

- Nov. 26, 1860 Kenworthy, James, M.D., *Parkgate, Cheshire.*
- Feb. 19, 1855 King, Alfred, 14, *Newington*, and 9, *Netherfield-rd. South.*
- Jan. 10, 1848 Lamport, William James, 21, *Water-street*, and 5, *Beech-terrace, Beech-street, Fairfield.*
- *Jan. 14, 1839 Lassell, William, F.R.SS.L. and E., F.R.A.S. 27, *Milton-street*, and *Broadstones, Sandfield-park, West Derby.*
- April 27, 1862 Lassell, William, Jun., 27, *Milton-street*, and *Tue Brook.*
- Oct. 21, 1844 Lear, John, 1, *North John-st.*, and 22, *Holland-terrace, Duke-street, Edge-hill.*
- Feb. 10, 1862 Leycester, Edmund Mortimore, Commander R.N., *Admiralty Office, 2, Drury-lane*, and 20, *Belvedere-road, Prince's-park.*
- Dec. 10, 1860 Leyland, Joseph, *Williamson-square.*
- Feb. 9, 1863 Lister, Edward, L.R.C.P.E., 1, *Deane-street, Fairfield.*
- May 4, 1863 Lister, James, *Union Bank, 6, Brunswick-street*, and *Greenbank, 166, Breckfield-road North.*
- Feb. 9, 1863 Loraine, Rev. Nevison, M.A., 1, *The Willows, Breck-road.*
- Oct. 20, 1859 M'Andrew, James Johnston, 5, *North John-street*, and *Greenfield Cottage, Bromborough.*
- *Oct. 21, 1844 M'Andrew, Robert, F.R.S., F.L.S., *Isleworth House, Isleworth, London.*
- March 9, 1857 MacFie, Robert Andrew, 30, *Moorfields*, and *Ashfield Hall, Neston, Cheshire.*
- April 20, 1863 Marples, David, 50B, *Lord-street*, and 168, *Chatham-st.*
- April 4, 1853 Marrat, Frederick Price, 22, *Arcade*, and 2, *Peverille-terrace, Edge-lane.*
- Jan. 21, 1839 Martin, Studley, *Exchange-chambers*, & 109, *Bedford-st.*
- Feb. 5, 1844 Mayer, Joseph, F.S.A., F.R.A.S., F.E.S., 68, *Lord-street.*
- Jan. 12, 1863 Mellor, Rev. Enoch, M.A., 15, *Devonshire-road, Prince's park.*
- April 1, 1861 Melly, George, 7, *Water-street*, and 90, *Chatham-street.*
- Oct. 31, 1859 Moore, Thomas John, Corr. Mem. Z.S., Curator Free Public Museum, *William Brown-street.*
- Jan. 8, 1855 Morton, George Highfield, F.G.S., 9, *London-road.*
- April 16, 1849 Moss, Rev. John James, B.A., *Upton, Cheshire.*
- Oct. 29, 1850 Mott, Albert Julius, 19, *South Castle-st.*, and *Holt-hill.*
- April 3, 1854 Mott, Charles Grey, 27, *Argyle-street, Birkenhead*, and 2, *Shewell's-road, Holt-hill.*

- Oct. 20, 1856 Nevins, John Birkbeck, M.D., Lond., M.R.C.S., Lect.
on Materia Medica, Roy. Infirmary School of Medi-
cine, 25, *Oxford-street*. VICE-PRESIDENT.
- April 7, 1862 Newlands, Alexander, 6, *Rumford-place*, and 13, *Canning-
street*.
- Nov. 3, 1862 Newlands, Capt. Alex., *Elm Tree Farm, Fairfield*.
- Dec. 15, 1851 Newlands, James, F.R.S.S.A., Borough Engineer, 2,
Cornwallis-st., and 4, *Clare-terrace, Duke-st. North,
Edge-hill*.
- *Nov. 29, 1847 Nisbet, William, L.F.P.S.G., *Church-street, Egremont*.
- *Oct. 15, 1855 North, Alfred, *Salcombe Hill, Sidmouth, Devonshire*.
- Nov. 18, 1861 Nugent, Rev. James, *Crosby*.
- Oct. 6, 1862 Owen, Rev. Loftus, 46, *Eastbourne-street*.
- Mar. 23, 1863 Page, Rev. George C., LL.D., *Gambier House, Fairfield*.
- Nov. 4, 1861 Philip, Thomas, D., 49, *South Castle-street*, and 47,
Prospect-vale, Fairfield.
- Dec. 28, 1846 Picton, James Allanson, F.S.A., Chairman of the
Library and Museum Committee, 11, *Dale-street*,
and *Sandy-knowe, Wavertree*.
- Feb. 6, 1854 Prange, F., *Royal Bank-buildings, Dale-street*, and 2,
Grove-park, Lodge-lane.
- April, 7, 1862 Rankin, Robert, Chairman of the Dock Board, 55,
South John-street, and *Brombro' Hall, Cheshire*.
- †Mar. 13, 1812 Rathbone, William, 20, *Water-street*, and *Greenbank,
Wavertree*.
- Nov. 12, 1860 Rathbone, Philip H., 4, *Water-street*, and *Greenbank-
cottage, Wavertree*.
- Mar. 24, 1862 Rathbone, Richard Reynolds, 21, *Water-street*, and
Laurel Bank, St. Michael's-road.
- *Jan. 7, 1856 Rawlins, Charles Edward, Jun., 23, *Cable-street*, and
1, *Windermere-terrace, Prince's-park*.
- *Nov. 17, 1851 Redish, Joseph Carter, Vice-President of the Philomathic
Society, 18, *Chapel-st.*, and *Church-rd., Wavertree*.
- Mar. 20, 1854 Rigge, Thomas, 64, *Rodney-street*.
- Nov. 2, 1840 Robberds, Rev. John, B.A., 58, *High Park-street*.
VICE-PRESIDENT.
- Feb. 10, 1862 Rogers, Thomas Law, M.D., M.R.C.P., Superintendent,
County Asylum, Rainhill.

- Feb. 9, 1863 Ronald, Lionel K., 19, *Dale-st.*, & *Elm House, Edge-lane*.
 April 18, 1854 Rowe, James, 2, *Chapel-walks*, and 51, *Shaw-street*.
 Mar. 23, 1863 Roxburgh, Archibald, 11, *Rumford-place*, and 98, *Bedford-street South*.
- April 7, 1862 Samuel, Harry S., 1, *Victoria-buildings, Hackin's-key*, and 2, *Canning-street*.
 April 6, 1846 Scholfield, Henry Daniel, M.D., Oxon, M.R.C.S., 14, *Hamilton-square, Birkenhead*.
 *April 21, 1862 Smith, James, *Barkley House, Seaforth*.
 †Mar. 13, 1812 Smith, James Houlbrooke, 28, *Rodney-street*, and *Green-hill, Allerton*.
- Feb. 23, 1863 Smith, J. Simm, *Royal Insurance Office, Dale-street*.
 Feb. 24, 1862 Snape, Joseph, Lecturer on Dental Surgery, Royal Infirmary School of Medicine, 75, *Rodney-street*.
 Nov. 12, 1860 Spence, Charles, 4, *Oldhall-street*, and 21, *Catherine-street*.
 Feb. 10, 1862 Spence, James, 30, *North John-street*, and 54, *Upper Parliament-street*.
- Dec. 14, 1857 Steele, Robert Topham, 4, *Water-street*, and 8, *Bedford-street South*.
 Dec. 2, 1861 Steinthal, Rev. Samuel Alfred, 59, *Rodney-street*.
 Oct. 18, 1858 Stuart, Richard, 10, *Exchange-street East*, and *Brooklyn Villa, Breeze-hill, Walton*.
- *Feb. 19, 1855 Taylor, John Stopford, M.D. Aberd., F.R.G.S., 1, *Springfield, St. Anne-street*.
 Jan. 23, 1843 Taylor, Robert Hibbert, M.D. Edin., L.R.C.S., Ed., Lect. on Ophthalmic Medicine, Royal Infirmary School of Medicine, 1, *Percy-street*.
- Dec. 11, 1854 Thompson, Samuel H., *Thingwall Hall, Knotty Ash*.
 Nov. 17, 1856 Tinling, Chas., 60, *Castle-st.*, and *Bedford-terrace*, 48, *Low-hill*.
 Nov. 26, 1860 Tooke, William H., *Church-street*, and *Wellington-street, Waterloo*.
- Dec. 1, 1851 Towson, John Thomas, F.R.G.S., Scientific Examiner, Sailor's Home, 47, *Upper Parliament-street*.
 *Feb. 19, 1844 Turnbull, James Muter, M.D. Edin., M.R.C.P., Phys. Royal Infirmary, 86, *Rodney-street*.
- Oct. 21, 1861 Unwin, William Andrew, 11, *Rumford-place*, and *Newbie-terrace*.

- Oct. 21, 1844 Vose, James Richard White, M.D. Edin., F.R.C.P.,
Phys. Royal Infirmary, 5, *Gambier-terrace*.
- Mar. 18, 1861 Walker, Thomas Shadford, M.R.C.S., 54, *Rodney-street*.
- Jan. 27, 1862 Walmsley, Gilbert G., 50, *Lord-street*.
- Feb. 10, 1862 Weightman, John Hardham, 57, *Ranelagh-street*, and
27, *Baker-street, Low-hill*.
- Dec. 2, 1861 Weightman, William Henry, *Leith Offices, Moorfields*,
and *Hapsford-lane, Litherland*.
- Jan. 26, 1863 Whitelaw, George, *Collegiate Institution*.
- April 7, 1862 Whittle, Ewing, M.D., Lecturer on Med. Jurisprudence
Royal Inf. Sch. of Med., 65, *Catherine-street*.
- Oct. 29, 1855 Wilks, William George, 1, *Dale-st.*, and *Mill-bank, Anfield*.
- April 7, 1862 Willans, Thomas H., 82, *Rodney-street*.
- Nov. 18, 1861 Williams, Charles Wye, A.I.C.E., *The Nook, St.*
James's Mount.
- Mar. 18, 1861 Wood, Geo. S., *Belle-vue-road, Wavertree*, and 20, *Lord-st*.
- Feb. 9, 1863 Wood, John W., 81, *Church-street*.

HONORARY MEMBERS.

LIMITED TO FIFTY.

- 1812 Peter Mark Roget, M.D. Edin., F.R.C.P., F.R.S., F.G.S., F.R.A.S.,
F.R.G.S. &c., 18, *Upper Bedford-place, London*.
- 1819 John Stanley, M.D. Edin., *Whitehaven*.
- 1827 Rev. William Hincks, F.R.S.E., F.L.S., Professor of Natural
History in University College, *Toronto, C.W.*
- 1828 Rev. Brook Aspland, *Dukinfield, Cheshire*.
- 1833 The Right Hon. Dudley Ryder, Earl of Harrowby, K.G., D.C.L.,
F.R.S., *Sandon-hall, Staffordshire*, & 39, *Grosvenor-square, London, W.*
- 1833 James Yates, M.A., F.R.S., F.L.S., F.G.S., &c., *Lauderdale House*,
Highgate, London.
- †1835 John Ashton Yates, F.R.G.S., *Bryanston-square, London*.
- 1835 George Patten, A.R.A., 21, *Queen's-road West, Regent's-park, London*.
- 1835 William Ewart, M.P., *Cambridge-square, Hyde-park, London*.
- 1835 The Right Hon. Lord Brougham and Vaux, M.A., D.C.L., F.R.S.,
Chancellor of the University of Edinburgh, 4,
Grafton-street, London, W., and *Brougham Hall*,
Penrith.

- 1837 The Most Noble William, Duke of Devonshire, K.G., M.A., F.R.S.
F.G.S., &c., Chancellor of the Univer. of Cambridge,
*Devonshire House, London, W., and Chatsworth,
Derbyshire.*
- 1838 Geo. Biddell Airy, M.A., D.C.L., F.R.S., Hon. F.R.S.E., Hon.
M.R.I.A., V.P.R.A.S., F.C.P.S., &c., Astronomer
Royal, *Royal Observatory, Greenwich.*
- 1840 James Nasmyth, F.R.A.S., *Penshurst, Kent.*
- 1840 Richard Duncan Mackintosh, L.R.C.P., *Exeter.*
- 1841 Charles Bryce, M.D., Glasg., Fell.F.P.S.G., *Brighton.*
- 1844 J. Beete Jukes, M.A., F.R.S., M.R.I.A., F.G.S., Local Director of
the Geological Survey of Ireland, 51, *Stephen's-green,
Dublin.*
- 1844 T. P. Hall, *Coggeshall, Essex.*
- 1844 Peter Rylands, *Warrington.*
- 1844 John Scouler, M.D., LL.D., F.L.S., *Glasgow.*
- 1844 Thomas Rymer Jones, F.R.S., F.Z.S., F.L.S., Professor of Com-
parative Anatomy, *King's College, London.*
- 1844 Robert Patterson, F.R.S., M.R.I.A., *Belfast.*
- 1844 ——— Alger, *Boston, U.S.*
- 1844 Sir Charles Lemon, Bart., M.A., Cantab., F.R.S., F.G.S., *Penrhyn,
Cornwall.*
- 1844 William Carpenter, M.D., Edin., F.R.S., F.L.S., F.G.S., *Registrar
London University.*
- 1847 Sir William Rowan Hamilton, LL.D., Hon. F.R.S.E., M.R.I.A.,
F.R.A.S., F.C.P.S., Astronomer Royal for Ireland,
Dublin.
- 1848 Rev. Thomas Corser, M.A., *Strand, Bury.*
- 1850 Rev. St. Vincent Beechy, M.A., Cantab., *Worsley, near Eccles.*
- 1851 James Smith, F.R.S.S.L., and E., F.G.S., F.R.G.S., *Jordan-hill,
Glasgow.*
- 1851 Henry Clarke Pidgeon, *London.*
- 1851 Rev. Robert Bickersteth Mayor, M.A., Fell. St. John's Coll. Cantab.,
F.C.P.S., *Rugby.*
- 1852 William Reynolds, M.D., *Coed-du, Denbighshire.*
- 1853 Rev. James Booth, LL.D., F.R.S., &c, *Stone, near Aylesbury.*
- 1857 Thomas Jos. Hutchinson, F.R.G.S., F.R.S.L., F.E.S., H.B.M.
Consul, *Fernando Po.*
- 1860 Sir William Brown, Bart., *Richmond-hill, Liverpool.*
- 1861 Louis Agassiz, Professor of Natural History in Harvard University,
Cambridge, Massachusetts.

- 1861 William Fairbairn, LL.D., C.E., F.R.S., *Polygon, near Manchester.*
 1861 Rev. Thomas P. Kirkman, M.A., F.R.S., *Croft Rectory, Warrington.*
 1862 The Right Rev. H. N. Staley, D.D., Bishop of Honolulu,
Sandwich Islands.
 1863. Edward J. Reed, Chief Constructor of H.M. Navy, *Admiralty, and*
Hyde Vale, Greenwich, S.E.
-

ASSOCIATES.

LIMITED TO TWENTY-FIVE.

- Dec. 2, 1861 Captain James Anderson, R.M.S.S. "China," Cunard
 Service, 34, *Richmond-terrace, Everton.* (Atlantic.)
 Jan. 27, 1862 Captain John H. Mortimer, ship "America." (Atlantic.)
 Mar. 24, 1862 Captain P. C. Petrie, "City of London," Commodore
 of the Inman Line of American Steam Packets.
 (Atlantic.)
 Feb 9, 1863 Captain James P. Anderson, First Officer R.M.S.S.
 "China," Cunard service, *Commercial Hotel, Dale-st.*
 (Atlantic.)
 Feb. 9, 1863 Captain John Carr (Bushby and Edwards), ship
 "Scindia," 43, *Hope-street.* (Calcutta.)
 Feb. 9, 1863 Captain Charles E. Pryce, R.N.R. (L. Young and Co.),
 ship "Cornwallis" (Calcutta and Sydney).
 April 20, 1863 Captain Fred. E. Baker, ship "Nippon." (Chinese seas.)
-

TREASURER'S ACCOUNTS, 1861-62.

Dr.

Literary and Philosophical Society, in Account with ISAAC BYERLEY, Treasurer, to October, 1862.

Cr.

| | £ | s. | d. | | £ | s. | d. |
|---|------|----|----|--------------------------------|------|----|-----------|
| To paid Brakell for Printing "Proceedings" | 68 | 3 | 4 | By Balance from last account:— | | | |
| " Tinling for Printing and Stationery | 14 | 1 | 4 | Dock Bond | £100 | 0 | 0 |
| " Secretary's General Expenses of Management.. | 17 | 13 | 0 | In Bank | 55 | 8 | 10 |
| " Miscellaneous Accounts | 1 | 5 | 0 | " proceeds of Festival | 50 | 0 | 0 |
| " Editorial Fee | 10 | 10 | 0 | | | | 205 3 10 |
| " Special Vote to Secretary for extra duties..... | 10 | 10 | 0 | " Subscriptions (Annual) | | | 115 10 0 |
| " Mrs. Johnson, Tea, Coffee, &c..... | 12 | 3 | 8 | " (Arrears) | | | 11 0 6 |
| " Balance due to Treasurer | 4 | 0 | 8 | " Entrance Fees | | | 18 18 0 |
| " Collector's Commission | 5 | 7 | 0 | | | | |
| " Waiter's Attendance | 2 | 7 | 6 | | | | |
| " Share of Expense for Stationery, &c., for "Gal- lery of Inventions" Committee..... | 2 | 0 | 0 | | | | |
| " Balance due to Collector..... | 2 | 19 | 0 | | | | |
| | | | | | | | |
| | 151 | 0 | 6 | | | | |
| Balance carried down..... | 199 | 11 | 10 | | | | |
| | | | | | | | |
| | £360 | 12 | 4 | | | | £350 12 4 |
| | | | | | | | |
| | | | | Balance brought down— | | | |
| | | | | Dock Bond..... | £100 | 0 | 0 |
| | | | | In hands of Treasurer | 99 | 11 | 10 |
| | | | | | | | |
| | | | | Exclusive of Arrears..... | 199 | 11 | 10 |

October, 1862, Errors excepted.

Audited and found correct,

J. C. REDISH,

CHRISTIAN D. GINSBURG.

PROCEEDINGS
OF THE
LIVERPOOL
LITERARY AND PHILOSOPHICAL SOCIETY.

ANNUAL MEETING—FIFTY-SECOND SESSION.

ROYAL INSTITUTION, October 6th, 1862.

The REV. H. H. HIGGINS, M.A., the retiring President,
in the Chair.

The minutes of the last meeting having been read and signed,
The SECRETARY read the following

R E P O R T .

The Literary and Philosophical Society commences this, its fifty-second Session, under conditions more favorable, and with prospects more encouraging, than have, perhaps, ushered in any previous Session since its foundation fifty years ago. Having fully completed the *first* half-century of its existence, it has, instead of declining, only thereby reached that mature age, and self-sustaining position which enables it to enter upon a *second* with every anticipation of an increasing career of usefulness, and a more extended sphere of action. Long as the Society has been in existence, it remained for the spring of the present year to bring it into such prominent notice as it had never before obtained, and to gain for it an

amount of publicity it had never before received. The completion of its fiftieth year, which took place in March last, was naturally embraced by your Council as an event worthy of celebration, and the success of the Jubilee Festival is now a matter known to every one. An account of the proceedings of that festival forms part of the volume for the past year; and it may be said that the success of that celebration has given the Society an impulse which will long be beneficially felt. It is for the members of the Society to avail themselves of the passing opportunity of enlarging its bounds and increasing its influence.

One of the most healthful signs exhibited by the Society is the small number of resignations which have taken place, and the large number of accessions it has received to its ranks during the past year. We count but seven names retiring from the list, five of whom have left Liverpool, two only having resigned from other causes. Death, which was so busy during the previous Session, has, during the past year, deprived us of none of our ordinary members. Against this small number of losses we have to place thirty-nine newly-elected members, among them, gentlemen who may, and no doubt will, be of considerable service to the Society. The number of ordinary members at the close of the last Session was 166.

As a natural consequence, the funds of the Society are in a flourishing condition. Instead of withdrawing £50 from the reserve fund as it was thought it might be necessary to do, that sum has been *added to* the £150 previously in the hands of the Treasurer, while the newly-elected members have contributed a further sum of £50 to the working expenses, upwards of £30 of which (£38 13s.) are added to the permanent income of the Society. The Treasurer's accounts, which will be laid before you this evening, will show, that although the Society's expenses have been unusually great during the last

two or three years, its present financial condition is a matter, not of doubt and fear, but of congratulation.

Our list of honorary members has been increased by the addition of the names of four gentlemen, some of whom have already proved themselves *working* members of the Society. As there are but thirty-eight names on this list, which might contain fifty, it is a matter of consideration whether the Society should not judiciously fill up the vacancies during the present Session. In this class of members, however, we have lately sustained a loss which cannot be otherwise than keenly felt by the Society. Dr. Thomas Stewart Traill, the founder and first Secretary—the able and energetic pilot of the Society in its earliest days—the untiring caterer of literary and scientific material during its period of infancy and youth—expired, full of years, at his residence, Rutland-square, Edinburgh, on the 30th July last, aged 80. It is impossible for those of the present generation adequately to appreciate the influence which Dr. Traill exercised upon the early years of the Society, but the few of his contemporaries who are still spared know that he was the *mainspring* of the Society—its unwearied promoter and active supporter—its very life and soul. A reference to the early records of the Society proves the vast number of communications which he laid before the members, upon the most varied subjects of literature and science, exhibiting that extraordinary versatility of talent which distinguished him to his latest years. He was born at Kirkwall (where his father was parish minister) in 1781, and in 1803, he settled in Liverpool as a general practitioner.

In the palmy days of the Augustan period of literature in Liverpool, Dr. Traill played a leading part. Not only was he associated with the foundation of our Society, but also with that of the Royal Institution in which we meet, so that his memory has a double claim upon our reverence and respect. He was, moreover, one of the founders of the Liverpool

Mechanics' Institution, and delivered the first course of lectures connected therewith, on chemistry, in 1825. In 1832, he was appointed Professor of Medical Jurisprudence in the University of Edinburgh, and he henceforth quitted Liverpool, having first filled the office of President of our Society. Since that period his name has been upon our list of corresponding members. He retained his Edinburgh professorship up to the time of his death, and his latter years have given ample proof that his mental powers survived in their full activity. The gigantic labour of editing the last edition of the *Encyclopædia Britannica* was undertaken by him, and achieved in spite of his increasing years. That great work was safely carried by him through the press, and is a fitting monument of the vast information, unwearied research, activity of mind, and persevering industry which he brought to bear upon everything which he undertook.

The laws of the Society not having been printed since the edition of 1848, although various changes have been made from time to time, it was deemed advisable to issue a new edition. To that end, your Council carefully revised them, and suggested amendments and improvements in accordance with the present condition of the Society; and having submitted them to general meetings of the members, they were approved and passed, and were incorporated in the corrected edition now in the hands of the members.

The most important change in the constitution of the Society made during the past Session was the introduction of a new class of members, termed *Associates*. The Literary and Philosophical Society will probably never regret having initiated a plan which is likely to be productive of so much benefit to the causes of science and philanthropy. The number of Associate members is limited to twenty-five, but only three were elected last year, because the Society was of opinion that the distinction should be cautiously given, and that time

should be allowed to make it more generally known among the class which it was intended to embrace. A further step in the same direction which your Society carried out was the drawing up of suggestions, addressed to the officers of merchant vessels, how best to employ the opportunities they possess for advancing zoological information, by observation and collection in foreign countries. These directions will be found printed in an *Appendix* at the end of the volume; and the Council further voted a sum of money for the printing and circulation of these directions among those to whom they are addressed.

It is not expected that any sudden accessions of knowledge or of specimens will accrue from this movement, but the information thus widely disseminated, and the impulse thus given to scientific study among our merchant seamen, cannot fail to work gradually, but nevertheless surely, and beneficial results will doubtless exhibit themselves ere long.

The volume of Proceedings for the past year has been somewhat delayed, but will shortly be in the hands of the members. The papers it contains sustain the character of the society, and are both of a literary and scientific nature. One of them has been considered of sufficient importance to have been adopted by the Government, and the Committee of Council on Education has requested the author to supply copies for the use of the Navigation Schools under the Department of Science and Art.

Measures continue to be taken for placing your library on a proper footing and in an efficient condition. Your Secretary has secured promises of correspondence from numerous societies, and the exchanges take place with greater regularity than heretofore. The Committee of the Royal Institution have taken steps to provide more accommodation for books than was previously obtainable, and the Society's volumes will shortly be placed in a condition for binding and cataloguing, in order to be of further service to the members.

Proposals will be brought before you to increase the popularity of the Society's meetings by admitting *ladies* at certain stated periods, and it is believed that by this means the Society may become more widely known and appreciated, without in any degree derogating from its dignity or scientific value. It is well known that the admission of ladies is an essential element of the popularity of some societies, such as the Royal Geographical Society and the British Association, and it is believed that on certain occasions, when papers of more general interest are to be read, the throwing open of the meeting to ladies may be attended with beneficial results.

The delegates from the Society to assist in the management of the Gallery of Inventions and Science regret that they cannot make a very satisfactory report. The building is ready to receive models, &c., but the Library and Museum Committee have expressed their inability to supply the funds for the expenses of keeping up the exhibition. Under these circumstances it becomes a matter of debate whether the functions of the delegates should cease, or whether they should be re-elected for another year, in the hope that some means may be suggested by which the plans of the united committees may be carried out. The closing of the International Exhibition presents opportunities for obtaining objects of interest for the gallery which seem to render it desirable that the Committee of Management should not cease to exist at this juncture.

The Literary and Philosophical Society may well be proud of its position. Established upon a firm basis of public support—more widely known through the medium of its recent successful Jubilee Festival—it occupies a place in the town of Liverpool which no other society *can* occupy. The prestige of its age, as the *senior* scientific society—the reverence due to its founders, as the literary and scientific ornaments of Liverpool—the interest of its history, associated

for so long a period with the *personal* history of her most distinguished citizens,—these are causes sufficient to make us regard it with just pride, and to stir ourselves into activity for the promotion of those objects which this society is so well calculated to attain. Add to this an increasing number of members, and a consequent increase of funds, and it will at once be perceived that we have at the same time the advantages of mature age and renovated youth—of reverence for the past, and of renewed hope for the future. On the *members*, therefore, it depends to render the Society by their exertions, worthy of themselves, and of the town, to keep up the character of its Proceedings, to come forward with original papers, and to exhibit to the literary and scientific world, a volume which shall compete, in the value of its contributions, with that of any other provincial learned society.

You will be called upon this evening to select a gentleman from your body to act as your President for the next three years. In accordance with Law 36, also, it will be necessary to ballot for five gentlemen who were not upon the Council of last year, to take part in the deliberations of the succeeding one; and the retiring Council recommend for that purpose the following names:—Mr. A. Higginson, Mr. H. S. Evans, Mr. J. A. Picton, Mr. P. H. Rathbone, Mr. A. Baruchson.

(Signed,)

H. H. HIGGINS, M.A., President.

CUTHBERT COLLINGWOOD, M.A., Hon. Sec.

The Treasurer, Mr. BYERLEY, then laid his annual statement of accounts before the Society, which was received and passed. It showed a balance of about £200 to the credit of the Society.

The Rev. H. H. HIGGINS, M.A., on vacating the chair of the Society, then read the following

VALEDICTORY ADDRESS.

Gentlemen of the Literary and Philosophical Society.

The three years which have passed since you did me the honour to elect me as your President have seen great and most important movements in literature, in natural science, in the town of Liverpool, and in our own Society.

Literature has received an impulse by the establishment of a system of competitive examinations throughout the country; and now, for the first time, the chief of the honours and emoluments at the disposal of the nation are brought to bear upon the advancement of the standard of liberal education.

Many honourable trophies have been won in the fields of natural science; the astronomer has been supplied with a new "arm of precision," in the analysis of the spectrum; man has been further from the earth than ever he has been before, to return again; and great progress has been made in tracing the relations between the imponderable agents, light, heat, electricity, and force.

But it is in zoology and botany that, as I believe, the greatest progress has been made, affecting not so much the physiologists, who have, for a much longer period thoroughly appreciated their own department of labour, as the more ordinary class of naturalists, who, by Mr. Darwin's work on the "Origin of species," have been taught, and have already extensively learned, the true meaning of natural history,—that it is the science not merely of the distinctions between living forms, but of comparative life. Much as I disagree with the conclusions of Mr. Darwin, I regard the publication of his book as an epoch in natural history.

It is quite unnecessary for me to dwell upon the importance to the town of Liverpool of such events as the opening of the Free Public Library and Museum, the establishment of the Science, and the formation of the Naturalists'

With so many fresh demands upon the support of the friends of science in Liverpool, it could hardly have been held a wonder if our own Society had received somewhat less of public attention than formerly, but the case has happily been quite the reverse. The circumstances of our prosperity are before you in the Report drawn up by one who, more than any other individual, has contributed to the measure of our recent success.

It only remains for me to resign into your hands the trust committed to me. The distinction of having been your President will, through life, be to me a source of grateful recollection. For this honour I sincerely thank you, and in resuming my place amongst you I anticipate in my future attendance at your meetings a continuance of the profit and pleasure which, for a period of fourteen years, I have from time to time so largely received.

It was then moved by the Rev. J. ROBBERDS, B.A., seconded by Mr. BARUCHSON, and resolved unanimously—"That the retiring President be requested to allow his Address to be printed in the Proceedings of the Society."

The Rev. Mr. Higgins gave his assent to this proposal.

The following officers were then elected in the usual manner:—

President (for three years) :

WILLIAM IHNE, Ph.D.

Vice-Presidents :

Rev. H. H. HIGGINS, M.A.

J. BIRKBECK NEVINS, M.D.

Rev. J. ROBBERDS, B.A.

Treasurer :

ISAAC BYERLEY, F.R.C.S., F.L.S.

Hon. Secretary :

CUTHBERT COLLINGWOOD, M.A. and M.B. (Oxon), F.L.S., &c.

The following gentlemen were also elected members of the Council :—

Joseph Carter Redish, Charles Clark, Thos. John Moore, Corr. Mem. Z. S., Rev. Christian D. Ginsburg, Alfred Higginson, M.R.C.S., Henry S. Evans, F.C.S., J. A. Picton, F.S.A., Philip H. Rathbone, and Arnold Baruchson.

The following gentlemen were re-elected as delegates to the Gallery of Inventions and Science :—Rev. H. H. Higgins, Dr. Nevins, Dr. Collingwood, Mr. A. Higginson, and Mr. H. Duckworth.

Captains Anderson, Mortimer, and Petrie, were continued in the list of Associate members of the Society.

The Society then took into consideration the following recommendation of the Council :—“ That ladies be invited to attend such meetings of the Society as the Council shall from time to time select,” which was moved by Dr. Ihne, and seconded by the Rev. H. H. Higgins ; whereupon an amendment was moved by Mr. Unwin, seconded by Mr. H. Duckworth—“ That ladies be admitted to all the meetings of the Society.” On a division being taken, the original motion was carried by a large majority.

The Rev. Loftus Owen, and Mr. William Crosfield, jun., were then elected ordinary members of the Society.

Numerous donations to the Library were then laid upon the table, a list of which will be found in an Appendix.

FIRST ORDINARY MEETING.

ROYAL INSTITUTION, October 20th, 1862.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

The following communication was received from the Committee of the Royal Institution, respecting the death of Dr. Traill, one of its founders :—

“That, having long regarded Dr. Thomas Stewart Traill with affectionate veneration, as one of the founders of the Liverpool Royal Institution, whose lectures shed a lustre on its early history, who was most intimately associated with whatever distinguished Liverpool, in the days when Liverpool first obtained a name in literature and science, and knowing that, notwithstanding the severance of his immediate connection with this town by his appointment to the chair of Medical Jurisprudence in the University of Edinburgh, he retained to his last hour a deep and heartfelt interest in the community he had so signally benefited in years gone by; the Committee of the Liverpool Royal Institution now contemplate his decease with respectful and sorrowful emotion, and deem it a peculiar privilege to be entitled to enter on their records how truly they participate in the regret so universally felt on the removal, by death, of one so widely known and largely honoured, as the accomplished editor of the latest edition of the *Encyclopædia Britannica*, to which he so largely contributed.

“Resolved—That a copy of this resolution be sent to the Literary and Philosophical Society.

(Signed,) “EDWARD BANNER, Hon. Sec.”

A discussion followed as to how the Society could best mark its respect for the memory of Dr. Traill, in which the Rev. H. H. Higgins, Mr. James Smith, and the Secretary, took part; various suggestions were offered, and the matter was finally referred to the Council.

Captain Wilhelm Gutkäse, of the Oldenburgh barque *Australia*, was balloted for, and elected an Associate, on the recommendation of the Council.

The President, WILLIAM IHNE, Ph.D., then read the following

INAUGURAL ADDRESS.

GENTLEMEN,—Half a century has gone by, since this Society was founded. Half a century is a period not inconsiderable in the history of the human race. If a balance were drawn of all that has been gained and lost to mankind in such a number of years, it would, even in times of partial stagnation, be a comparison full of the most astounding results. But the last half century was not a period of stagnation. It was pre-eminently a period of never-lagging progress—of a progress such as no similar period of time since the dawn of history has surpassed or equalled. Good, honest work has been done by millions of workers. No field of human activity has remained fallow. The whole aspect of the surrounding world, over which man can exercise an influence, has been changed, and changed so thoroughly, that no imagination is powerful enough to reproduce the picture of the world in 1812. Even those few of us, who have lived through the whole of this period, must find it impossible fully and totally to realize the great change. As the child grows daily under our eyes, and as each successive development slowly and almost stealthily supplants the appearance of yesterday, and obliterates it from our memory, so in the growth of society we lose the consciousness of great changes produced, unless we can indelibly fix an impression on our mind, wipe out of it all intervening stages, and place by the side of the early picture the impression of latter days.

That which is so entirely impossible, I cannot venture even to endeavour to realize. It would require not only a super-human imagination, but also an all-comprehensive knowledge of things, which no individual human being can aspire to. But even an imperfect, a very imperfect comparison of our condition in 1862, with the condition of our fathers in 1812,

faulty and defective as it must necessarily be, may contain some portion of instructive truth, and seems not inappropriate at a time when we, as a Society, enter, as it were, upon a second portion of our career. It may contribute to inspire hope and confidence for the future, and it certainly will urge us on to increased exertions in our work, that our children, when they look back upon our days, may not point to us as laggards in the great work of the education of the human race.

In the year 1812, when a few good and thoughtful men met in this town to organise a Society for the cultivation of the arts of peace, the whole of Europe was ringing with the clang of arms from the Rock of Gibraltar to the snow-covered wastes of Russia. The great destroyer was still at work, and he was just then collecting his victims for a most horrible hecatomb. This island had put forth its whole strength, and concentrated all its energies for the work of human slaughter. Fortunately, her fields showed not the track of hostile armies—no ruined towns and smouldering villages betokened, as on the continent of Europe, the fearful ravages of war. The friendly element of the ocean girded her round “as a moat defensive to a house.” She truly proved—

“A fortress built by nature for herself
Against infestation and the hand of war.”

But that war was still a curse, and weighed heavily upon the land. All trade was paralysed by the mad endeavour of the enemy to shut out the produce of English labour from all the continent of Europe. Bread was dear, money scarce—even liberty shrunk from the stern word of military command. For a time, the development of constitutional freedom, which had marked England from all the nations of the earth, had come to a standstill. One imperative necessity, the struggle for existence, overruled all other aspirations. It was a time of gloom, and almost of

despair. Her own children rose against the mother country. To the implacable foe, who, on the continent of Europe, had armed a million of men, were joined in hostility to England the free states of the American Union. War and the havoc of war on every side—discontent and depression at home—such was the condition of England in the year 1812.

At length the spell was broken. It was broken by the inordinate ambition, or rather by the madness of the French Emperor, intoxicated by twenty years of uninterrupted success. Napoleon returned a fugitive from Russia—all Europe rose in arms against him. He fulfilled his destiny in the lonely island, where disappointed ambition, like the eagle of Prometheus, preyed upon his vitals.

Peace returned once more, and the works of peace again engaged the attention of men bowed down and disgusted with war. Much had to be done, and much was done. In politics, in law, in social relations, in trade, in industrial pursuits, in art, in science, in education, in building, in planting, in draining, in making streets in the towns and roads in the country, in excavating docks and improving harbours for our ships, in saving life from shipwreck and disease, in thousands and thousands of directions the improving hand was set to work, and it wrought wonders.

It is the glory of England, that, through all the vicissitudes of her history, she has kept burning the sacred flame of freedom. When the whole of Europe was sunk in military despotism, the English Parliament met in free debate, and asserted a power superior to that of the sword. It is a still greater glory to this country, that she has communicated the sacred fire to her neighbours, and that in almost every country of Europe at the present day the principles of constitutional government, adopted with more or less success, have superseded the absolutism of an evil period. The whole of Europe now enjoys popular representation, with the exception of the

three states, where civil and religious power are combined in the hands of the ruler, *i.e.*, in Rome, Turkey, and Russia. Not everywhere is this representation perfect—not everywhere is it as yet fully secured against reactionary violence; but even where it is rendered nugatory by a temporary prevalence of despotic authority, its existence even in its weakness is a tribute paid to the spirit of liberty; even there its animation is only suspended—the living breath will return—the age of despotism is no more.

Whilst communicating freedom to the nations of Europe, England has not ceased to extend her own. Let any one compare the constitution and the laws of this country, as they were in 1812, with what they are now. Who can fail to be struck with the wondrous progress made? The great measures of Catholic Emancipation, the reform of Parliament, the reform of the municipal government of towns, the repeal of the Corn Laws, the reforms in the civil law, the abrogation of a barbarous penal code, the abolition of slavery, the freedom of trade and of navigation, the self-government of the colonies, the re-organization of the Indian empire, are only the most familiar and the most comprehensive of the numerous improvements made in this period so fertile in legislative enactments, and so universally pervaded by the spirit of justice, kindness and humanity. What has been done for the poor factory children, for the toilers in our mines and ships, for our criminals and felons, would be enough to characterize the age. And striking at the root of all social, intellectual, and even moral defects, the legislature has endeavoured to lessen the ignorance of the masses by giving with a bountiful hand the means for educating the people. How many were the villages, and the poor streets in our towns, which in 1812 could boast of a good school? How many of the working men could write their names, or read with sufficient ease to derive intellectual pleasure from books, or information from newspapers? It

may now be said with truth, that every child in this country of England has within its reach the means of a sound education, and thereby the means of rising in the social scale, or of becoming an intelligent and useful member of society.

If in our modern legislation we have successfully battled with the ignorance, the prejudice, the selfishness and the apathy of former days, we have been still more successful in exploring the laws of nature, in overcoming her obstacles, and in making her forces subservient to our well-being. Our success in this struggle is at once so vast, that I could not attempt to survey it at one glance, and so familiar to all of us, that it would be a waste of time to attempt it. We have seen in one generation the whole of this country, and a great portion of Europe and America, covered by a network of railways, which alone would have sufficed to revolutionize society. If we could imagine these iron roads swept away for one week, nay, for one day; if we could realize the possible result of such a calamity, we should then be able to form a notion of the wonderful change that has been operated. A faint idea can be formed by those who have witnessed the sudden paralysis caused in the traffic of mighty London some years ago by a strike of the London cabmen—a strike which lasted only a few days. The action of the imperial legislature was immediately called into play to remedy the evil, which fortunately was one remediable by the human will alone. But no legislative authority could restore our viaducts and tunnels, our engines and carriages, our wonderful railway machinery, if the force of mind that called them all into existence should suddenly cease to act, or if a convulsion in nature were to destroy the work of our hands. We should be as miserable mariners, whose craft had foundered on the high sea, and who were helplessly crowding into a frail boat.

Wherever we turn, we see the same results, the same triumphs of science. It is too trite to dwell on the luxury and

convenience which the rich and the poor alike enjoy by the introduction of gas, by the perfection of machinery of every kind, by the abundance, the cheapness, the good quality of the many thousand different products of our looms, our mines and our forges. We have become familiar even with the two most brilliant inventions of the last decennium, the electric telegraph and the photographic art. The speed of steam has become too slow for us, the art of the painter too inaccurate and too expensive. We convey intelligence with the rapidity of thought, and have made a limner of the light of the sun.

No field of human research has remained uncultivated. In natural science, we see a revolution begun before our eyes. The laws of natural development, of the growth of species, are on the eve of receiving an undreamt-of clearness ; chemistry has grown so rapidly, that the new discoveries of a few years back are almost antiquated. Science has discovered new modes of healing our infirmities, and has found the means of charming away all sense of pain under the terrible knife of the operator ; we have studied the laws that regulate the most unsteady of all elements, the winds and storms, and we can furnish the mariner with instruments and with knowledge, which will safely conduct him through hurricanes. The boundless realm of the starry heavens has been searched by our telescopes, and by science, more searching than the brightest speculum ; we have seen planets added to the solar system, and satellites to the planets. Our own planet has been explored to the impenetrable barriers that circle the poles, and to the dreary wastes which conceal the interior of the large continents. The scientific explorer has ascended the giddy heights of the Andes, and has floated higher than the Himalayas ; he has dropped the lead to the bottom of the ocean, and mapped out its bed. In every element, in every clime, science has courageously and gloriously laboured to understand the eternal laws of the all-wise Creator, and has

returned from her labours with some gain for man, and with a still deepening veneration for the author of this beautiful world.

It is hardly to be expected that we should have been equally successful in literature as in science, especially in that part of literature which is not scientific in its nature and operations—which deals more with the beautiful than with the true. The energies of an age are no more unlimited than those of an individual. When they are put forth powerfully in one direction, there must be a comparative pause and quiet in another. The man absorbed in analysing the qualities of a gas, or in tabulating the notations of barometers or anemometers—the man whose brain is at work all day, and often for long hours in the night, to reconcile phenomena, apparently discordant, under a law in which they shall harmoniously combine, will not, nay, he cannot, give his whole soul to the calm enjoyment of the beautiful. The poet, therefore, who reveals the secret working of human feeling, who paints the beautiful in the flower and the landscape, finds but a half attentive listener ; his heart fails him, and his muse becomes silent. It is no use deceiving ourselves. We live in a prosaic age. Not in England alone, but wherever we look among other nations, we find a restless activity of the mind ; but the poetic faculty, both creative and receptive, is for the present in a state of torpor. This is most perceptible in the drama, the highest walk of the poetic genius. The land of Shakspeare has produced in the last fifty years no play that will live on the stage, and the latter-day productions of our play-wrights are utterly contemptible, and a disgrace to our age.

No field has been more productive in the last half-century than that of poetry in prose, *i.e.*, the literature of novels. Sir Walter Scott is the founder of a new era in this branch. His writings, which partly belong to the period I am speaking of, have kept their ground, and are a permanent acquisition to

English classical literature. Nor have his followers been wanting in success. The English novel has acquired the dignified position of a teacher of life, of character, and moral duty. The tone that pervades it, is, on the whole, serious, earnest, high. Some of our best men have devoted their pen to it, and have laboured to produce, not a passing amusement of the hour, but works of high art and merit.

Great and highly successful have been the labours bestowed during the last fifty years upon history. Historical criticism was firmly established by Niebuhr. His history of Rome has formed a new era in our investigations of that period of the past, which is anterior to the time of contemporary witnesses, and over which tradition has, therefore, thrown a veil of fable, fiction, and faint traces of truth. Whilst Germany may claim the credit of having established the canons of critical investigation, and of having collected vast materials for history, English historians have produced the most perfect works of historical art. Lord Macaulay takes a position by the side of the greatest writers of any age. No historian of either Greece or Rome, none of modern times surpasses him in beauty of style and arrangement, in depth of thought, in philosophical calmness, and impartial judgment. Macaulay has founded a new era for historical writing. He has narrated not only the great political events in a noble, dignified, and engaging style, but he has painted the inner life of the times ; he has reproduced the past not only in the palaces, the council chambers, and the battle-fields, but in the workshop of the artizan, in the merchant's house, in the fields where the peasant worked. Had he enjoyed health and life to finish his great work, it would have been sufficient in itself alone to establish the literary greatness of this age and country.

Several other names deserve honourable distinction by the side of that of Macaulay. The first comprehensive and masterly history of Greece was written by a London banker,

Mr. G. Grote. Mr. Hallam's works are proofs of conscientious labour, though they are not perfect in form and expression ; Mr. Froude, Mr. Merivale, and many other men of great ability have devoted themselves with more or less success to this branch of literature, which, if properly understood, is calculated to reconcile us with the present, to inspire hope for the future, and to free us from the errors and prejudices of the past.

Several endeavours have been made, both in England and abroad, to investigate the laws of historical development, but as yet with no great success. The most comprehensive attempt was made by the late Mr. Buckle, who unfortunately broke down, it appears, under the huge labour he had undertaken. That there are laws in historic development, there can be no doubt ; they are a combination of the laws of external nature, and of the laws of the human mind and of human action. The influence of these laws on the freedom of the human will, and the dependence of the whole on the supreme government of the world, which is in the hands of the Creator, constitute the difficulty of this subject, which still waits a solution from future inquirers.

One branch of historical research, not the least interesting, is that into language. Our century has devoted particular attention to this subject. We have studied languages, not only as in former times, to become acquainted with them in a given form. We have analysed them, we have searched their genesis, their development, their connection with other languages, and our discoveries have been startling. As in natural science we discovered analogies by the aid of scientific study, which were hidden from the common observer, so in languages we have found out affinities extending over all the chief dialects of Europe and far into Asia. We have established the fact of an Indo-European family of languages, and, as a matter of course, we have traced a historical connection between

the different races far beyond the period of the most ancient historical records.

Linguistic researches have also been made into the lost language of Persia. Cuneiform inscriptions have been brought to light, and, as it is alleged, deciphered. If future inquiries should prove this to be correct, it will be an astonishing triumph of scientific divination; but at present it is not safe to approve or to condemn. Even the discoveries of Egyptologists, all the readings of hieroglyphics, and the chronology of Egyptian kings, are called into question by recent critics, among whom, Sir G. Cornewall Lewis, the Home Secretary of this country, wields the most formidable and destructive pen.

In classical literature much has been done, especially in Germany, during the last fifty years; but in spite of the more brilliant scholarship of individuals, it is an undoubted fact that the mass of educated men are less familiar now with the writings of antiquity than our great-grandfathers used to be. The cause of this is, that the relative value of classical literature, compared with that of modern times, has been sinking for a long time. The great writers of Greece and Rome no longer supply food enough for our literary appetite. There are many ideas, interests, and feelings, which have become part of our nature, but which the ancients did not know of. Human life has become richer, deeper,—human thought more expanded,—human sympathies wider, than they were two thousand years ago. We have now a modern literature, which has grown out of our own civilisation, with which we are one, and which we are called upon to cultivate; and we, consequently, have less sympathy with, and less time for the study of classical writers. They become more and more the domain of a separate class of scholars in proportion as they lose their hold on the mass of educated men. Progress made in pure philosophy, in logic, psychology, metaphysics is not very decided, though there has been

no lack of activity, especially in Germany and France. Systems of metaphysics have been built up with great depth, vigour, and boldness of thought ; but it will hardly be maintained, that any undoubted and permanent acquisition has been made. According to his *assumed* premises, every successive philosopher has been able to construct his system with logical sequence ; but it has not been difficult for succeeding thinkers to demolish the intellectual edifice by removing some portion of the foundation, which rested on mere hypothesis or assumption. The Infinite has not yet surrendered its inscrutable secret to the boldest and most persevering inquirers. We are still surrounded on every side by a dark veil, which no human hand seems ever destined to lift. Yet the repeated endeavours to solve the problem of existence and of final cause are not to be deprecated or deplored. They are a necessity of the human mind. As the hidden life of the plant unfolds its leaves to the light, so the mind of man will ever yearn to approach the source of all light. We cannot help ourselves, we must strive and struggle, and even though absolute knowledge be eternally withheld, in this our earthly existence, we cannot divest ourselves of that love of eternal truth, which is our noble attribute and a pledge of our higher nature.

But though the direct results of philosophical studies be but short glimpses at a truth still eluding our grasp, yet their secondary results are most beneficial. All other sciences culminate finally in pure philosophical science. Philosophy supplies the true methods of investigation—it furnishes the best principles of criticism—it is the air which they breathe, and by which they live—its stagnation or corruption would soon be followed by a general collapse of the human intellect, by a cessation of human progress, by a return of barbarism.

Gentlemen, what is the lesson, we learn from a survey of our progress in the period which has just elapsed ? In proportion as we are able to appreciate it, as we have knowledge

to follow the development in its various directions, as we have imagination to compare the past and the present, we must be struck with wonder and with awe at the great advance that has been accomplished. But stronger still must be our conviction, that our ignorance is greater than our knowledge, our weakness more decided than our strength, that our past success is as nothing to what lies still before us of struggles for truth, for wisdom, for justice, for happiness. We have seen, that no external accident has brought us so far. It has been hard work all through, work of the mind in the first place, then perseverance in realising objectively what the mind had discovered to be possible or desirable. From the time that Adam Smith explained the principles of unshackled industry, to the full realisation of the freedom of trade, what a long interval of years, what a series of struggles ! So it has been with all great truths. Mankind cannot receive them like the light of the sun, which rises in the morning and sends its rays over the world without our asking or working for them. All intellectual, moral, and social improvement must be worked for, and can be appropriated only in the ratio of the honesty and universality of that work. Whoever does not lend his hand is not worthy to enjoy the benefits obtained by the workers : his heart must be intensely selfish, his appetites low, his mind torpid. Let us, gentlemen, disdain to belong to this class of men, a class unfortunately very numerous. Let us, each one in his own sphere, labour earnestly, patiently, lovingly. We cannot all make great discoveries ; but there is not one of us, totally unable to contribute to the general store. I pity the disdainful, self-sufficient ignorance of those who, because they have themselves failed to master the rudiments of knowledge, think slightingly of the endeavours of literary men and men of science. They want to see miracles ; but even miracles would not induce them to put away their indifference to a cause they have not mind enough to understand.

Gentlemen,—It is not for us to boast of what we in this Society have already accomplished. But no more would it become us to indulge in a false modesty, and to say, that in fifty years we have contributed nothing to the general store, that has grown so prodigiously. Our volumes of transactions are sufficient evidence that we have not been idle. Many of the papers read before this Society are of great scientific value, and have been recognised as such beyond the limits of this town by the first men of this country, and even abroad. It would be invidious to single out those that might appear the most valuable and the most productive of results. I do not pretend to be able to fix the relative value of the several contributions to our transactions. Nor is this desirable. It is not individual papers, but the character of the whole that must decide our claim to be considered a learned Society.

Whilst congratulating the Society upon their past energy and the ability shown in many of the papers read here, I cannot help expressing my regret that, in a community like Liverpool, a community numbering nearly, if not quite, half a million, a town that boasts to be the second in the empire, a town productive of great men, there should be found no more than about one hundred and fifty members to form one of the first and oldest provincial learned societies, and among these members, very few indeed of the men of wealth and leisure. Is it that the fashionable air and aristocratic leaders are wanting, which make the London societies so attractive to many? Is it want of time? Let nobody plead engrossing business or overwork. Gentlemen, it is not lack of leisure, but lack of pleasure, lack of mind and knowledge, that keeps men from devoting themselves to intellectual occupations. Look at men like Mr. Gladstone, Sir G. C. Lewis, Lord Russell, Lord Brougham, Lord Campbell, Sir Bulwer Lytton, Mr. Grote. If they could find time in the most absorbing and mind-taxing occupations to write works that will for ever be ornaments to

the literature of England, surely, then, our merchant princes might afford to resemble the great Medici in more than a name. But, gentlemen, let us not look to the right, nor to the left; let us pursue the course marked out for us. However negligent others may be, who ought to stand by us, we are pledged to persevere in the investigation of truth. The future is not without hope for us. We are entering on the second half-century under encouraging auspices. Let us work honestly and increasingly, that it may be said in truth of our Society—

Vires acquirit eundo.

SECOND ORDINARY MEETING.

ROYAL INSTITUTION, November 3rd, 1862.

WILLIAM IHNE PH.D., PRESIDENT, in the Chair.

John Cameron, M.D., Captain Alexander Newlands, Mr. Robert Highat, and Mr. S. H. Behrend, were balloted for and duly elected members.

The PRESIDENT exhibited some pieces of pottery recently discovered at Chester, concerning which the age was somewhat doubtful.

Mr. MARTIN exhibited specimens of *Zostera marina*, the new cotton substitute proposed by Mr. Harben, together with some of the fibre obtainable from it, which led to a discussion upon its merits, the result of which was rather unfavourable to its value as a *substitute* for cotton, although it was admitted that it might probably prove a valuable *supplement*.

The paper of the evening was then read by the Rev. T. P. KIRKMAN, entitled—

AN EXAMINATION OF MR. MILL'S THEORY
OF THE CHARACTER AND PROOFS OF
MATHEMATICAL DOCTRINES.

(*Vide* "System of Logic," vol. 1, book ii, cap. v, 4th edition.)

BY THE REV. H. S. BYRTH, of Bardsley.

IN attempting to disprove the necessary and universal truth of geometrical axioms, Mr. Mill denies the real existence of geometrical figures, asserting that axioms are proved by experience, and that the test of inconceivableness fails ; but it is contended, first, that he ignores geometrical solids, which, on the principle of "sufficient reason," cannot be denied to exist, and are as irreconcilable with his theory as lines and points, while the existence of these latter is proved by that of the former. Secondly, that the axioms concerning geometrical lines are not true of any lines cognisable by experience, in any sense of the word, either legitimate or to the purpose. Thirdly, that Mr. Mill, professing to take his definition of necessary truth from Dr. Whewell, leaves out the most important qualifications ; that through forgetfulness of the ambiguity of the word "inconceivable," his examples are irrelevant ; that he does not produce one instance of propositions inconceivable (in the same sense as the denial of Euclid's axioms) at one time and conceivable at another ; that he thus leaves the test of unconceivableness untouched. Incidentally, his suggested substitution for an axiom of Euclid seems, on the most liberal interpretation, either to betray ignorance of the character of Euclid's reasoning, or to furnish an instance of false conversion. He also appears more than once, unconsciously, to concede the point in dispute. Such slips on the part of so eminent a logician would, in themselves, lead us to suspect the unsoundness of his theory.

THIRD ORDINARY MEETING.

ROYAL INSTITUTION, November 17th, 1862.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

In accordance with a new bye-law, ladies were, for the first time, invited to the meeting, and a large number were present on the occasion.

The PRESIDENT, on taking the chair, bade them welcome, and congratulated the Society on the response which its invitation had met with.

The SECRETARY laid the volume of Proceedings for the past Session on the table, and stated that it was ready for distribution among the members.

Dr. Collingwood announced that his friend, Mr. E. J. Reed, a gentleman with whose name every one was familiar, and who was at that moment, virtually employed by the Government to remodel our navy, was present at the meeting, and had kindly responded to his request to say a few words upon a subject which was of the utmost interest at the present time.

ON ARMOUR-PLATED SHIPS OF WAR.

BY MR. E. J. REED,

Secretary to the Institute of Naval Architects.

After apologising for addressing the audience so completely without premeditation, Mr. REED stated that the success of the Whitworth experiments arose from the nature of the projectiles employed, rather than from the nature of the gun. Cast-iron shot, when fired against armour-plates, crush up so instantaneously that they act rather as detached fragments than as solid masses. Malleable metal shots, on the contrary, spread out to an enlarged diameter at the moment of impact, and can only pass through the plate by forming a hole of corresponding dimensions ; but the hardened and well-tempered projectiles used by Mr. Whitworth, punch, as it were, a clean hole through the plate, of their own original size, and have therefore much less resistance to encounter than the Armstrong and other like shot and shell. It was to be observed, however, that the charge of powder which even the largest of the present Whitworth shells contained was comparatively small, although by carrying the same principle of construction further, an increased charge would doubtless be employed ere long.

After explaining the use of the timber backing behind the armour plates, and pointing out its reduced efficacy when opposed to Whitworth shot, Mr. Reed proceeded to say that he could well understand the astonishment, he might almost say the dismay, with which the accounts of the late experiments at Shoeburyness had been read in the *Times* by the

commercial classes a few days ago. It must have been most discouraging for them to learn that the colossal iron-cased ships upon which so many millions of the public money had been, and were being, expended, had proved vulnerable, not only to shot, but to explosive shells likewise ; and the discouragement felt must be all the greater from the reflection that as the employment of iron of $4\frac{1}{2}$ inches in thickness had led to the construction of enormously costly vessels, the employment of much thicker iron still, to which we must hereafter of necessity resort, would in all probability render yet far more costly structures necessary. He confessed that a couple of years ago only, the report of Mr. Whitworth's success would have suggested apprehensions of that nature to his own mind. He was happy to be able to state, however, that the changes which had been made during the last few months in the construction of iron-cased ships under the auspices of our own Admiralty had prepared him to observe that success with equanimity. He hoped he should be excused if, under the circumstances of the moment, he ventured to refer to the vessels now in course of construction from designs of his own, because it was impossible to avoid that course in stating the grounds upon which his confidence was based. He would first remind his audience that during the whole of the Parliamentary debates of last year upon this question, little or no attention was given to the alarming fact that, although our entire fleet of small craft—that is our frigates, corvettes, sloops, and gunboats—had been virtually rendered useless, being timber-built, and unprotected with armour, yet no step whatever had been taken towards replacing them with iron-cased craft. In fact, it had been confidently pronounced impossible to protect any such classes of vessels with armour, and the consequence was that up even to April last the smallest iron-plated ships which had been commenced fell but little short of 4,000 tons burden, and several of these were protected in a most imperfect manner.

Without attempting to detail to his hearers the suggestions which he had ventured to submit to the Board of Admiralty, or the prompt and energetic measure which that Board had taken in the matter, he would inform them that a complete revolution had now been effected in this respect. That revolution had been effected silently; there had been no outcry of any kind got up in reference to it; he certainly had not himself trespassed on the public attention in the matter; but the change was nevertheless already practically perfected. Perhaps the best manner possible of indicating the nature of the change would be to say that the Admiralty were at the present moment building in Pembroke dock-yard an armour-plated sloop, completely protected with $4\frac{1}{2}$ -inch armour, and that that ship was not of 4,000, nor of 3,000, nor even of 2,000 tons, but of 1,250 tons burden only. She was to be a full-rigged steamer, of moderate draught of water, and was to carry provisions for four months' continuous service, so that she might be sent to America, the Mediterranean, the Pacific, or China, just as satisfactorily as any ordinary wooden ship. Unlike his first vessel, the *Enterprise*, she was moreover free from all experimental features, so that any number of such vessels might confidently be proceeded with. In order to bring the qualities of a ship of this class more fully before the mind, he might perhaps, be allowed to compare her with the ship which at present represented Great Britain in the harbour of New Orleans, where the peculiar habits of General Butler might at any moment create a difficulty. The vessel referred to is her Majesty's sloop *Rinaldo*, an utterly unprotected wooden vessel, carrying a comparatively light armament, and exposed, of course, to speedy destruction from shell fire. Contrasting this ship with the *Research*, he might say of the latter that she drew even less water than the other, was scarcely inferior to her either in sailing or steaming qualities, and was covered from end to end with armour of a thickness that had

hitherto proved impervious to both the shell and the shot of the United States navy. But it was not on account of her own qualities only that he referred to the Research class of war-ship, to which a much larger ship, the Favourite, also belongs, but because of the opportunity which her peculiar principle of construction afforded for meeting the increased power of the modern gun with an increased thickness of armour. It would be obvious to every one that a system of construction which had enabled us to reduce the size of our iron-cased ships down from 4,000 tons to little more than 1,000, will likewise enable us to increase the weight and thickness of the armour proportionately, provided we return to larger dimensions ; and he did not hesitate to say that, so far as the naval architect was concerned, there is positively no reason whatever why 9-inch, and even 12-inch, armour should not be employed upon our ships, and that, too, upon smaller ships than several of those now building. He might enlarge upon that phase of the subject considerably, if time permitted, and if it were prudent to disclose arrangements which are now in progress ; but he hoped he should be excused from doing so under present circumstances. He could not sit down, however, without adding a word upon that branch of the subject with which a great commercial town like Liverpool was more especially concerned—the pecuniary outlay expended upon the navy. The time had manifestly arrived when the time-honoured system of lavishing mere money upon the navy must be for ever set aside. The old plan was, when any deficiency was felt to exist in that arm of the service, to spend a few more millions in the construction of ships of the style and character which were in fashion at the moment, with little or no regard to the possibility of improving them. This system gave us crowds of sailing ships long after the introduction of steam propulsion ; it gave us crowds of costly wooden line-of-battle ships after the French were known to be replacing theirs

with iron-cased vessels ; and it has given us an immense supply of half-built ships upon the stocks which nobody in the world knows how to deal with. What we have now to look to is, that it does not give us fleets of iron-cased craft constructed without reference to the certain development of the future. What we require, in fact, is to spend wisely every farthing that we do spend ; to give professional skill and science legitimate scope ; to expend brains as well as money, in short, upon the national work. Mere money only will not supply the necessities of this eventful period ; mere money will not even purchase security for the country. We have entered upon a keen and incessant competition with the brains and with the scientific enterprise of the world, and it requires all the administrative acumen and foresight that the Admiralty can exercise in order to carry us through so momentous a time. He had no fear whatever for our security, or our renown either, if scope were freely given to the skill and intelligence that, as a people, we possess ; on the contrary, he believed that the very changes and revolutions now in progress may, with wise management, be made instrumental in securing for us a more powerful and eminent position than ever.

At the close of Mr. Reed's remarks, he received the thanks of the Society for so kindly coming forward to speak upon topics of so much interest, and upon which, as it was observed, there was no higher authority, as was testified by the promptness with which the Board of Admiralty had carried out his views.

A paper was then read, of which the following is an abstract :

ON THE
MANUFACTURE OF STONE IMPLEMENTS
IN ANCIENT AND MODERN TIMES.

BY THE REV. A. HUME, D.C.L., F.S.A.

THE author commenced by noticing the arrangement of antiquities made by Mr. Thompson, of Copenhagen, into those of the bone, stone, bronze, and iron periods; since, by that means, degrees of civilisation might be studied geographically over the world, as well as historically in the modern seats of civilised nations. His objects for exhibition and illustration comprised a triturating stone, with roller and rubber—the former from Ireland, the latter from Fernando Po; querns; numerous examples of the stone malleus; hand war clubs from New Zealand; celts, wedges, &c., from Denmark, Ireland, England, Fiji, and New Zealand; flints from the drift on the banks of the Somme; flint arrows, combs, fish-hooks, &c., from Danby Moor, Yorkshire; and numerous flint flakes, sling-stones, &c., in general from the east coast of Yorkshire.

The triturating stone, still used in New Mexico, and occasionally by the Caffres at the Cape, is a first approach to grinding. It is not very different from the two stones between which the Australian natives pounded the seeds in the expedition of Burke and Wills. In the countries which have progressed, this was succeeded by the pestle and mortar, and then by the quern, the wind-mill, the water-mill, &c. The quern was usually turned by two persons, as it is still in the Scottish Highlands, and the labour was regarded as very servile, hence slaves and captives were frequently employed in per-

forming the task. Though modern millers have laboured to destroy the stones, they are still found, from the eastern side of Asia and the west of Europe; and in the countries of primitive habits, they are still in actual use. Numerous quotations were given from our old English literature illustrative of its use in former times. The malleus, or hammer, was of various forms, often like the sledge-hammer of a smith, a wooden handle passing through its centre. In the eleventh century, the Anglo-Saxons used "bipennis" and "stan-ex" as convertible terms, so that they seem to have used such stone mallets, or to have thought that the Roman bipennis was of that shape. Many of those are found in connection with the bones of large animals now quite extinct. Several elegant hand war-clubs were exhibited, from New Zealand—one of elegantly carved wood, and another of stone. Those of black stone are identical, in form and size, with specimens found in England and Ireland; but a rare and curious one was shown of the favourite material, green-stone. A piece of this had been hidden during the disturbances at Massacre Bay, and so valuable was it supposed to be, that a space of ground, four or five acres in extent was dug over to a depth of four feet for the purpose of finding it. Ancient green-stone axes have also been found in our own country, as well as in France. An object of this kind is sometimes called a "sacrificing axe," and the making of it occupies a man, at intervals, about two years. He rubs it with a small flint stone of the size of a walnut, or a small egg. The chisels, or wedges, are still more varied in their forms, their uses, and the places in which they are found. Several of them were shown mounted, for the purposes of war or the chase; some were shown blocked out, others partially ground, and some with defects taken out of them by grinding. In a few instances objects in metal had been imitated, in form, by subsequent ones in stone. No objects were shown mounted in stags' horn; but it was stated that these are of frequent

occurrence in the crannoges of Ireland, the lacustrine habitations of Switzerland, and in some of the cuttings in France.

In drawing attention to the flint arrow-heads and chippings, Dr. Hume noticed the valuable researches of M. de Perthes, of Abbeville, who had added a new and important chapter to science. He has shown that instead of archæology "piecing on" to geology, the two interlace or overlap; the human or archæological period, having preceded several of the changes of a geological kind. On this part of the subject, however, he touched but briefly.

At the conclusion of the paper, Mr. H. DUCKWORTH exhibited some flint weapons from the gravel of the Somme, and made some remarks upon them.

Dr. COLLINGWOOD referred to the recent discovery of lake habitations in Norfolk similar to those found in Switzerland, and made some observations regarding the antiquity of the human race, as shown by the drift deposits of the Somme.

FOURTH ORDINARY MEETING.

ROYAL INSTITUTION, 1st December, 1862.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

Thomas Hakes, Esq., was balloted for and elected a member of the Society.

A short paper was read by M. Jules Gérard, "Sur les habitudes du Lion dans l'état sauvage."

The following paper was then read—

THE ANCIENT GOTHIC LANGUAGE, IN ITS RELATION TO THE OTHER INDO- EUROPEAN TONGUES.

By J. A. PICTON, F.S.A.

PART II.

IN the former part of this paper, I endeavoured to shew that the Gothic language is intimately connected with our own mother tongue ; that it is very near the point of convergence of all the Teutonic dialects ; that it gives the key to many of the peculiarities which distinguish this sub-family of tongues ; that by its copious system of inflexions it indicates its common origin and affinity with the Sanskrit, Greek, and Latin. I propose in the second part to continue the inquiry by reference to the vocabulary, as still more closely identifying the language with our own ; and by an occasional glimpse into the common radical connexion of all the branches of the great Aryan family. In doing so, I cannot but feel that I have to contend with two difficulties of a kind quite opposed to each other. A superficial glance at a page of English and Gothic placed side by side would excite a sceptical smile at the idea of any connexion existing between the two. On the contrary when the analysis has been carried out, and both are reduced to their simple elements, the connexion appears so obvious as to need no argument in proof. The subject is one of deep interest, as illustrating what written history fails to disclose. In the eloquent words of Max Müller—" Few men perhaps will be insensible to the pleasure we derive from being able to watch in the course of our studies the gradual growth of any form of human speech. The history of words is the reflexion of the history of the human mind, and many expres,

sions which we use in a merely, conventional sense are full of historical recollections if we can but trace them back to their original form and meaning."*

This is perfectly true, but it may be added that the study of words carries us back beyond the dawn of history, and throws a light upon the manners, habits, modes of thought and of life in remote ages, which have left no historical memorials behind.

It may be fairly stated that whatever terms we find in a language, native, not derived, represent ideas and things existing and familiar among the people who spoke the language. Acting on this principle, let us test the Gothic language, and ascertain as far as we may, both the relation in which it stands to ourselves, and the light it throws on the condition of our forefathers fifteen hundred years ago.

It matters little where we begin. As a familiar subject of comparison, let us take the Lord's Prayer. I give it in Gothic, Anglo-Saxon, and modern German. With the modern English we are all familiar. That our own vernacular tongue is the lineal descendant, the living representative of that spoken by the Angles and Saxons admits of no doubt; but the term *Anglo-Saxon* seems almost to ignore this, and to convert the speech of our forefathers, the old, "Englisca spræca," as they termed it, into a foreign language. Whatever connexion, therefore, we establish between the Anglo-Saxon and any other tongue, must equally apply to modern English in its radical and inalienable features, however the lapse of time may have modified its external forms.

G O T H I C .

Atta unsar thu in himinam ; veihnai namo thein.

Qimai thiudinassus theins.

Vairthai vilja theins sve in himina jah ana airthai.

* "Survey of Language," p. 16.

Hlaif unsarana thana sinteinan gif uns himma daga.

Jah aflet uns thatei skulans sijaima svasve jah veis afletam thaim skulam unsaraim.

Jah ni bringais uns in fraistubnjai ; ak lausei uns af thamma ubilin.

Unte theina ist thiudangardi, jah mahts, jah vulthus, in aivins. Amen.

ANGLO-SAXON.

Fœder úre, thu the eart on heofenum, si thin name gehalgod.

To-becume thin rice.

Ge-weorthe thin willa on eorthan, swa-swa on heofenum.

Urne dæghwamlicam hlaf syle us to-dæg.

And forgyf ús úre gyltas, swa-swa we forgyfath úrum gyltendum.

And ne gelæde thu us on costnunge, ac alys us of yfle.

MODERN GERMAN.

Unser Vater in dem Himmel, dein Name werde geheiligt.

Dein Reich komme ; Dein Wille geschehe auf Erden, wie im Himmel.

Unser täglich Brodt, gib uns heute.

Und vergieb uns unsere Schulden wie Wir unsern Schuldigern vergeben.

Und führe uns nicht in Versuchung, sondern erlöse uns von dem Uebel.

Denn dein ist das Reich, und die Kraft, und die Herrlichkeit, in Ewigkeit. Amen.

Omitting the doxology at the close, which the Anglo-Saxon version, being translated from the Vulgate, does not contain, the Gothic contains 53 words, the Anglo-Saxon 50, the German 48. Of the 53 Gothic words, 18 are repetitions or inflexions, leaving 35 distinct forms. Of these, 31 are

common to all the three languages, a few of the German ones being only found in the old dialect; one is common to the Gothic and German only, one to the Gothic and Anglo-Saxon only, two are somewhat doubtful, leaving none exclusively belonging to the Gothic. Of the fifty Anglo-Saxon words, nineteen are repetitions or inflexions, leaving thirty-one distinct forms. Of these, twenty-eight are common to the three languages, one is common to the Anglo-Saxon and Gothic, one to the Anglo-Saxon and German, and one doubtful (*heofenum*). Of the forty-eight German words, sixteen are repetitions and inflexions, leaving thirty-two distinct forms. Of these, twenty-nine are common to the three languages; one is common to the German and the Anglo-Saxon; one is common to the German and Gothic, and one is doubtful (*himmel*). Of course, the resemblance of the common words is of a radical character. Although in many cases it is sufficiently obvious at first sight, in others it requires a somewhat close analysis to demonstrate the connexion. Let us take a few words at random in illustration.

The word "kingdom," occurs twice in the Lord's Prayer. The Anglo-Saxon and German terms are the same; German, "*Reich*;" Anglo-Saxon, "*Rice*." The Gothic has two terms, "*Thiudinassus*," and "*Thiudangardi*." These are compound words, the separate terms of which are common to the sister tongues. "*Thiuda*" signifies the nation or people; Anglo-Saxon, "*theod*;" Old German, "*Deut*," or "*Diot*." * "*Gut-thiuda*," was the name by which the Gothic people called themselves. The radical "*thiu*" branches out into a large number of derivatives in the various Teutonic tongues. Originally, it seems to have conveyed the idea of property

* From this Old German word "*Diot*," is derived the modern word "*Diet*," as applied to a conference representing separate states or provinces, as "*the Diet of Worms*," &c. From the form "*Diut*" is derived the German national appellation, "*Deutsch*," anciently "*Diutiska*," signifying the race or people *par excellence*. See *Pictet, Orig. Indo-Europ.*, p. 84.

lying at the root of social union. "Thiuda," Anglo-Saxon, "theod," is the common-weal, the collective institutions of the state. The Gothic "thiuth," like the English "good," is used to signify both moral qualities and temporal blessings. Luke 1, v. 53—"He hath filled the poor with good things;" "gredagans gasothida thiuthe." "Guth sa thiutheiga," the blessed God.

As property among the wandering Teutonic tribes consisted to a great extent of slaves and captives, the word naturally came to express this idea. The Anglo-Saxon "theow" is used in this sense for a bond servant. Our modern word "thew" has a double descent from the Anglo-Saxon, and is used in two senses. As derived from "theow," it signifies brawn and muscle, as in "Hamlet"—

"Nature crescent does not grow alone
In *thews* and bulk."

As derived from "theaw," a word from the same root, it implies manners, morals, behaviour, as in Spenser—

"For well ye worthy been for worth and gentle thewes."

It will be seen that the same primary idea of gifts, attainments, presents itself in each. The second part of the word, "nassus," is identical with our termination, "ness," in such words as "idleness," "business," &c. In our old word, "heathenesse," it is used in exactly the same way to convey the concrete meaning, as in the Gothic "thiudinassus." The second term for kingdom, "thiudangardi," is literally the "guardianship of the common-wealth."

The other term for king and kingdom, "reik-s" (Latin "rex") though not found in the Lord's Prayer, is very extensively employed in the Gothic. It was used as a common suffix to the names of the rulers, as "Ala-ric," king of all. "Theodoric," properly "Thiuda-ric," king of the nation;

“Herman-ric,” warrior king ; “Fritha-ric,” or “Frederic,” king of peace ; “Rode-ric,” eloquent king ; “Athana-ric,” chosen king ; “Ricimer,” or “Emmeric,” king for ever.*

I propose, in the short space which I can claim for the present paper, without any very definite plan, to inquire into what ideas we have in common with our ancient kinsmen of the fourth century, and what insight we can derive, from the language as it then existed, into their habits and condition.

Whatever the Gothic tribes might have been in their original condition, in the fourth century, they were certainly an agricultural people. Most of our agricultural terms now in use were then employed in the same sense as now. “Land” and “ground” are words common to all the Teutonic tongues.

“Akr” (Eng. “acre,”) signifies a cultivated field ; originally it meant a piece of land enclosed by a mound. Latin, “agger.”

| | | |
|---------|------------|--------|
| Compare | Greek | ἀγρός. |
| „ | Latin | ager. |
| „ | Anglo-Sax. | æcer. |
| „ | German | acker. |
| „ | Swedish | åker. |

From this comes “akran,” fruit. The English “acorn” has usually been derived from oak-corn, but this etymology is extremely doubtful. The German “ecker,” the old Norse “akurin,” are evidently the same word, but have no connexion with “corn ;” the Norse term, like the Gothic, signifies fruit in general.

* This last appellation has had a singular fortune. “Emmerich” became a favorite German name. Transferred to France, it took the form of “Almeric,” shortened to “Aymer.” It was Latinised into “Emericus,” and carried over the Alps into Lombardy, was softened into “Amerigo,” the baptismal name of Vespucci, who claimed the discovery of the continent of America, and conferred his name upon it. Amongst the various sources of self-glorification of the bearers of the “Star-spangled Banner,” it is rather remarkable that no orator should have alluded to the proud prognostication of greatness conveyed in the name itself—“monarch for ever.”

To plough was expressed by “ arjan.”

Anglo-Saxon, erian.

Old German, aran.

Greek, ἀροῦν.

Latin, arare, aratrum, arvum.

The history of this word is curious and interesting—pointing backwards to the earliest origin of Indo-European civilisation.

The Sanskrit root, अर ar, has the primitive idea of motion forward, and in the causative form that of pushing or causing to go. When the cultivation of land was commenced by ploughing, this word was applied to the operation, and is found in every Indo-European dialect in some form or other. It was thence extended to any work which required skill, as—

German, ar-beit.

Gothic, ar-baith.

Latin, ar-s.*

In the course of time the distinction between the nomad tribes and those who cultivated the land became marked, and the latter were naturally designated by their distinguishing characteristics, as Aryas or ploughmen. The name thus connected itself with the progress of civilisation, and became a title of honour which the nation was proud to apply to itself. Hence in the Vedas we find Arya signifies faithful, devout, excellent. It is especially applied to those of pure race in contradistinction from persons of inferior caste. Aryavarta, the country of the Aryas, is anciently applied to Brahminical India par excellence. We find the name extended westward, and trace it in such names as Aram, Ararat, Armenia, Ari-maspi, &c. We find it in the Greek ἀλφω, to elevate, to extol; in the Irish “er,” noble. Pictét derives Hib-er-nia, Ib-er-ia, from “Ibh,” country, and “er,” noble, the country of the noble people.

* Thus, in Latin, “Art-ifex” signifies a skilled workman, an artist; “Opi-fex,” a common workman.

At what period the term "plough" was introduced and superseded the old "arjan," in the Teutonic and Norse tongues, we can only conjecture. It is not found in Gothic, and is rarely met with in Anglo-Saxon. It must, however, have been introduced at an early period, as we find it in the

| | |
|----------------|---------|
| Old German, | pflug. |
| Frankish, | phluog. |
| Norse, | plog. |
| Old Low German | ploeg. |

It was probably introduced when the form of the instrument was changed. The original "ara" was, like the Roman and Hindoo plough, calculated merely to scratch a furrow without turning over the soil. The change of form by the introduction of the mould board would naturally lead to a term for the new instrument expressive of turning over, which appears to be the radical meaning of pflügen. We find the idea in the Greek Πόλεω, which is applied in the same manner, and means both to turn over and to plough.

Many of the terms connected with rural life are identical with our own, as—

| | |
|------------|-----------------|
| Grund-u, | Ground. |
| Gras, | Grass. |
| Hav-i, | Hay. |
| Haith-i, | Heath. |
| Wait-eis, | Wheat. |
| Bar-is, | Bear or Barley. |
| Seth, | Seed. |
| Kaurn, | Corn. |
| Land, | Land. |
| Lein, | Linen, Flax. |
| Hug-s, | Hedge. |
| Triu, | Tree. |
| Sakkus, | Sack. |
| Vein-a, | Wine. |
| Vinth-jan, | to Winnow. |
| Thriskan, | to Thrash. |

With many others.

The terms in connexion with a Gothic household fifteen hundred years ago were not very dissimilar from our own. Our word "home" is represented by the Gothic "haim." This word is found in all the Teutonic dialects, with slightly different shades of meaning—

| | |
|----------------|--------|
| Old German, | heime. |
| Modern German, | heim. |
| Anglo-Saxon, | ham. |
| Old Saxon, | hem. |
| Swedish, | hem. |
| Danish, | hjem. |

The Greek *Κώμη* appears to have the same origin. The primary idea is that of a common habitation. In Gothic, it is used for village, as in the common Saxon termination, "ham." A family was called a "heiv," a name certainly indicative of industry, but now restricted to a community of bees. The master of the house was called the "heiva-frauja."

The name of their habitation was called "hus," house; the door, "daur;" the door-keeper, "daura-varðs," or door-ward.

One would like to verify the etymology of Horne Tooke, identifying this word with the preposition "through;" Gothic, "thairh;" the connexion appears to be very natural, but, unfortunately, they do not coalesce. The words occur in every Teutonic tongue; in the Low German dialects, the substantive begins with "d," and the preposition with "th." In the High German it is reversed, but in no case do they so approximate as to give any indications of a common source.

Even in Sanskrit, the terms are separate; *द्वार* dwār (door) has no connexion with *पर* para (through, or beyond). A window, in Gothic, was called "auga-dauro," eye-door; the roof, "hrot;" Anglo-Saxon, "hrof," from "hræfan," to hold fast; hence a "reef" in a sail. Greek, *ὀροφ-ή*.

Gibla, the gable.

Ubizva, the eaves.

Hauri, the hearth.

This originally meant a fire kindled on the floor ; so in St. John, 18, v. 18—" haurja vaurkjandans unte kald vas ;" "making a fire because it was cold."

Baurd, a table, a board.

Mes, a dining table, a board. Anglo-Saxon, myse.

Hence, the terms " mess," " mess-mate."

| | |
|--------------|-------------------|
| Mat, | meat, |
| Itan, | to eat. |
| Fodjan, | to feed. |
| Hlaif, | loaf—bread. |
| Miluk, | milk. |
| Salt, | salt. |
| Aurts, | vegetables, hence |
| Aurti-gards, | Eng., orchard. |

Furniture was, doubtless, in the time we are speaking of, very simple. The terms employed were, however, the forerunners of our own. Whilst dining off the " baurd," or " mes," they sat on a " sitl," Old Eng., " settle," or on a " stol ;" Eng., " stool." These words are employed with the most dignified associations, a monarch's throne is only a " sitl." A judgment seat is the " stana-stol." " Bad-i " was the name for the couch of repose, as " bed " is now. They fastened their doors with a " luka," as we do now with a lock. When weary, they rested their lower limbs on a " fotu-baurd," as we do now on a " foot-board " or " foot-stool." When visited occasionally by a " gast," Eng., " guest," he was waited on by the " mavi ;" Eng., " maid." The domestic relationships—

Fadr, Sunu, Dauhtar, Barn,

sufficiently identify themselves. When sick, they were visited by the " leikeis ;" Old Eng., " leech ;" and when conquered by " dauths," " death," they were finally laid to rest, as we shall be, in the " grab ;" Eng., " grave."

The " qairnus " (quern) or hand millstone was amongst the Goths, as amongst all the Teutonic and Celtic nations, the usual implement for grinding corn ; but it appears that, in the

fourth century, an advance had been made beyond mere hand labour. In St. Mark's Gospel, ch. 9, v. 42—where the passage occurs—"It were better that a millstone were hanged round his neck," in place of the phrase, "λίθος μυλικός," some Greek manuscripts read, "μύλος ὄνικός;" literally, "ass-millstone." This appears to have been the reading in the manuscript employed by Bishop Ulfilas, who has rendered it in a manner which shows that the idea was quite familiar. "Asilugairns." That these primitive machines were employed about that period by the Teutonic races there can be no doubt. About the middle of the last century in the south of France, the remains of an ancient villa of the Frankish period were excavated and brought to light. Amongst these were found a pair of millstones of the usual hand-quern form, but of larger size, into the upper of which an arm was fitted, with a yoke to which an ass was harnessed,* exactly realising the idea in the text.

The names of most of the domestic animals were identical with our own—

| | |
|----------|-------------|
| Auhs-a, | ox. |
| Stiur, | steer—bull. |
| Kalb-o, | calf. |
| Gait-ei, | goat. |
| Lamb, | lamb—sheep. |
| Vithr-u, | wether. |
| Svein, | swine. |
| Avi, | ewe. |
| Asilus, | ass. |
| Fula, | foal. |
| Hund, | hound—dog. |
| Dius, | deer. |
| Dub-o, | dove. |
| Han-a, | hen. |
| Fugl, | fowl. |

It might naturally be expected that the race whose warriors

* Arts et Metiers des Anciens, représentés par les Monumens; par Grivaud de la Vincelle. Paris, 1819.

sacked the city of Rome, and established the kingdom of Italy on the ruins of the Roman empire would possess a native vocabulary for arms and warlike terms. Many of these have been superseded in later times. Others are common to the whole race.

“Skild-u,” shield, is common to the whole of the Teutonic tongues—

| | |
|----------------|-----------|
| Old German, | skiölder. |
| Modern German, | schild. |
| Anglo-Saxon, | scyld. |
| Swedish, | sköld. |
| Danish, | skjold. |

The root from which this term is derived is common to all the Aryan languages, and presents the general idea of covering. Compare Sanskrit, छाया chháyá, a shadow.

“Vepna” is the same word as our “weapon,” and is used for arms or armour in general, whether offensive or defensive, equivalent to the Greek ὅπλα, for which it is used. It is found in most of the kindred dialects—

| | |
|----------------|----------------|
| Anglo-Saxon, | væpen. |
| Old German, | wafan. |
| Modern German, | waffen—wappen. |
| Swedish, | vapen. |
| Danish, | vaaben. |
| Il. | waepen. |

and Old Germans divided weapons into three “vapn,” cutting instruments, such as swords; rusting instruments, as spears; and “skott-; instruments, as javelins and arrows. The vapn, possessed an important signification in assemblies, and in their jurisprudence. Our laws of opinion in public meetings are derived from our ancestors. According to Tacitus, when they expressed it by groans; when they were

pleased, they struck their shields with their weapons, as we now thump the tables, or give the "Kentish fire." *

The term "wapentake," preserved to our own times as the name of a judicial court, is a relic descended to us from the remote forests of Germany. The court was so called from the fact that when sentence was pronounced the judge held out his spear, which all present touched in token of assent.†

The origin of this word is curious and significative, as giving a glimpse of the pre-historic condition of the Teutonic race. The etymology has been glanced and guessed at by lexicographers, but, so far as I can find, has not hitherto been demonstrated. Though afterwards used for arms in general, there is evidence to shew that originally it was limited to defensive armour only. Ihre observes (sub voce,)‡ "*wapn* proprie veteres significasse theracem, galeam, ocreas, et cetera, quæ in prælium abeuntes induebant." He further offers an opinion that *waffen*, *wapn*, &c., are derived from a lost root signifying to plait, to bind round, "orta sint a radice deperdita, quæ involvere cingere notaverit." We find in Gothic, "vaip" used for the plaited crown of thorns; also "veipan," for the act of placing the wreath on the head of the victor at the Olympic games. The latter word is closely connected, if not identical, with the Anglo-Saxon *weffan*, or *webban*—

| | |
|--------------------|--------|
| German, | Weben. |
| Old Low German, | Wippa. |
| Latin, | Viere, |
| To twist or weave. | |

Without going into further particulars, it may be stated that we are led insensibly, as the ultimate result, to the

* "Si displicuit sententia, fremitu adspernantur; si placuit, frameas concutiunt."
—Tacit. De Mor. Ger. ch., ii.

† "*Vapnatake* confirmatio sententiæ in judicio prolatæ per contactum armorum, lectis enim suffragiis de causâ examinatâ hastam iudex proferebat, quam adsesores omnes tangentes, sententiam confirmabant, *dæmt mid vapnatalaki* armorum tactu judicatum.—Varelius Ind. sub. voc.

‡ Gloss. Sujo-Goth, 1038.

Sanskrit root, वे *ve*, which embodies the idea of weaving and sewing, and which is found throughout all the Aryan tongues. From this inquiry we may fairly infer that the terms *wepn*, *wapn*, &c., originally signified a woven substance, as *wepa* and *waipa* do still in Icelandic. It would further appear that the first defensive armour of the Goths was nothing more than a thick woven or quilted garment; that from thence it extended first to defensive armour of whatever substance made, and afterwards to arms in general.

I have dwelt at some length on this term, principally to shew the extent of inquiry which may be opened up by a single word, and the interest which may be derived from the study conducted in the fair spirit of analytical inquiry. To those who have not entered upon the study, it may seem a little singular that the words *wife*, *whip*, *weave*, and *weapon*, should all be derived from the same original.

That the Goths were not without metallic armour is proved from the native terms employed.

“Hilm,” helm-et, is found in all the Teutonic dialects in nearly the same form. The root of this word is found in the Old Norse, “hilma;” Anglo-Saxon, “helan;” German, “hüllen,” to cover, which branches out into a variety of significations. In the days of chivalry, the pieces of tapestry which were thrown over the benches in the manner of modern anti-macassars, were called “hullings.” In the Lancashire dialect of the present day the cover of a book is called the “hilling.” In Anglo-Saxon, a crown is called “cyne-helm,” or king’s helmet, as in John, ch. 19, v. 5, “thyrnene cynehelm” is used for the crown of thorns. “Helm” was also used in the sense of protector, as a component part of proper names, *e.g.*, “Adhelm,” noble protector; “Friedhelm,” defender of peace; “Ruh-helm,” defender of repose.” It is an evidence of the

influence of the Goths during the decline of the Roman Empire that the ancient terms for helmet, “galea” and

“cassis,” should have been abandoned both in Low Latin, Italian, Spanish, and French, for the Teutonic term “helm,” slightly modified.

“Arw-asna,” arrow ; Anglo-Saxon, “arewa ;” Old Low German, “ör ;” Swedish, “arf.” This term is not found in the High German, where “pfeil” is the substitute ; Latin, “pilum.”

The use of the bow was not common amongst the Goths at the earlier period of their history, not being mentioned either by Cæsar or Tacitus as amongst their weapons ; but there is abundant proof of its use at a later period.

Many of the military terms now obsolete were common to the Goths, and our Anglo-Saxon ancestors.

Heer, army.

Sigis, victory.

“Hansa,” a troop, league, or association, whence the origin of the “Hanse towns.”

Brunjo, a breast-plate.

Anglo-Saxon, Byrn.

Old German, Brun.

Swedish, Bryn-ja.

Old French, Brugne,

From “Brun,” the breast.

In the Constitutiones Caroli Magni, we find a law—
“Bauga et brunnia non dentur negociatoribus,” “bows and breast-plates not to be furnished to tradesmen.”

The employment of the metals as coined money forms an important epoch in the advance of a people from barbarism to civilization. In the fourth century, the Goths seem to have been in a transition state in this respect. Amongst all the Aryan races cattle has been the original representative of property, and the first medium of exchange. The Sanskrit term for cattle, पशु *pasu* has passed into the Greek πῶν, πᾶν (to possess)—

| | |
|----------------|--------|
| Latin, | pecu. |
| Gothic, | faihu. |
| Anglo-Saxon, | feoh. |
| Old German, | fihu. |
| Modern German, | vieh. |
| Swedish, | fä. |
| Danish, | fœ. |

In the whole of these, with the exception, perhaps, of the Greek, the term has been interchangeable with wealth in general. From the Latin "pecus," we have "peculium," private property; "pecunia," first, property in general, and then coined money; so in the Anglo-Saxon "cwic-feoh," or "gangend-feoh," applied to cattle or sheep; "licgend-feoh," to immoveables; and "weorc-feoh," to property in slaves.* The same analogy holds good in the Old German and Norse languages.

Where coined money is specially alluded to in the Scripture and elsewhere, the Gothic version usually employs the foreign term untranslated, as "drakma," for Greek δραχμή; "unkja," for Latin "uncia;" "sikl," for Hebrew "shekel."

In other cases the Greek ἀργύρια is literally rendered by "silubreins," pieces of silver. The most general word employed, whether to express the Greek ἀργύριον, the Latin "denarius," or "mina," is "skatts," a term running through all the sister tongues—

| | |
|----------------|---------|
| Old German, | skazz. |
| Modern German, | schatz. |
| Old Saxon, | scat. |
| Anglo-Saxon, | sceat. |
| Old Frisian, | sket. |
| Swedish, | skatt. |
| Danish, | skat. |
| Holl. | schat. |

The general meaning is that of treasure, property in general,

* Mat. 10, v. 9—"Næbbe ne gold ne seolfer ne *feoh* in eowrum bigyrdlum;" neither gold nor silver, nor brass in your purses.

and by a secondary application, that of money. The derivation of the term, though it seems to have escaped the notice of Wachter, Ihre, Junius, and our older etymologists, is not far to seek, if we keep in mind the leading idea involved. The first notion of a circulating medium seems to have been, not that of trade or barter, but of obligatory payment, or compulsory tribute. "Skolan," "skila," "skulle," &c., in the old Teutonic dialects expressed obligation or debt, particularly the fines for homicide and other breaches of the law.* Some name must have been given to the property used for the purpose of paying the fine, and "skat," "skeat," &c., the terms so employed, seem to have been derived from the verb expressing the obligation, in the same way that "gelt," money, is derived from "gelten," to owe or to pay. The change of vowel from "u" to "a" in forming the substantive is the ordinary rule in Sanskrit, as "kavi," a poet, from "ku," to sound; "plava," that which swims, from "plu" to swim. The German "sollen," English "shall," are derived from the same original; also the old term "scot," as applied to a tax, and the old English "shot," descended to our own times for a score at a tavern. It is confirmatory of this derivation that the "shilling"—

| | |
|--------------------------|------------|
| Old Low German, | skilligr. |
| Anglo Saxon, | scilling. |
| Swedish and } Danish, | skillings. |
| Holl. | schelling. |
| German, | schilling— |

appears to have been the first coined money of the Teutonic races, and according to Wachter has the derivation alluded to above. The word originally meant a fine; "laga skilling," a fine imposed by law, and then passed to the piece of silver used for the purpose.

* So "skalk" signified a bond-slave, one who could not pay his fine for offences, and was therefore reduced to servitude.

"Schilling," is not found in the Old German, nor in the Gothic translation of the Scripture. It is, however, found in the Neapolitan fragments of the 5th or 6th century. In the Anglo-Saxon version of the New Testament, the word is used frequently as equivalent to the Greek "*ἀργύρια*." It may, therefore, fairly be inferred that coined money was first used by the Goths and Saxons about the fifth century of our era. There is one word for money in the Gothic version which is a little perplexing. In Mat. 5, v. 27, "thou shalt not depart thence till thou hast paid the uttermost farthing; the Greek *σέπεντες* is translated by "kintus," a term found nowhere else, and of which the radical meaning and the derivation, are quite unknown.

Proceeding on the principle that native terms in any art imply an indigenous origin, unless they can be shown to be translations; the origin and progress of letters amongst the Gothic races presents a most interesting field of inquiry. The space at my command forbids me entering upon the subject with any minuteness of detail, but I will endeavour to state with as much brevity as possible the general conclusions arrived at from a somewhat extensive area of investigation.

The original terms for writing in the whole of the Aryan languages, in their primary meaning signify cutting or scratching. They are as follow—

Sanskrit, लिख् *likh*.

Greek, γράφω.

Latin, scribo.

German, schreiben.

It is commonly supposed to be derived from the general diffusion of the same radical in all the Aryan tongues, it is more probably of native origin in the

Swedish, skrifa.

Low German, schrywen.

Danish, skrive ;

and in these cases it signifies "to write," in our sense of the term; but originally it meant to scratch or cut, in which sense alone it is found in the Gothic "skreitan," to cut or tear; Anglo-Saxon "screopan," to scrape.

It is also found in the Celtic tongues—

Hibernian, schriobham.

Cambrian, ysgrivenny.

Breton, skriva,

where it means to write. In the old Norse dialects it was also used in the sense of drawing and painting. Our word "write" is found in the Anglo-Saxon, "writan," which is employed in the modern sense. The Norse "rita," signifies both to draw and to write. The German "reissen," now only used to express cutting, tearing, and sketching, formerly meant also to write.

This may suffice to show the original idea involved in the expressions for writing. The only exception to this is the Gothic language, in which the term for writing points, as I will show hereafter, to an altogether different origin.*

All the original terms for books, writings, and manuscripts, signify either wood or the bark of a tree.

In Greek, *βιβλος* is the inner bark of the papyrus. In Latin, "codex," meant a block of wood, "liber," the inner bark of a tree. The Teutonic races, without exception, use the term "book" for a collection of writings.

The history of this word is the history of Teutonic civilisation. For its origin we must go back far beyond the range of history to the period before the Aryan race had left their eastern father-land and separated into distinct tribes.

We find in Sanskrit the root, भक्ष् bhaksh, or भग् bhag, to eat. The Sanskrit roots, if roots at all, of which there can be

* All the terms above alluded to are very suggestive of one common origin, but unfortunately the Sanskrit root which would prove the converging point is wanting.

no doubt, are common to all the Aryan tongues, and must have existed from the origin of the race. From the abstract idea of eating, the simplest transition is to the thing eaten. We find in the Zend or ancient Persian, an Aryan tongue closely allied to the Sanskrit, the term *bûk* applied to the *Quercus bellota*, a species of oak which produces edible fruit.

Turning to the Greek language, we find the same root in *φάγ-ω* to eat; * *φηγ-ος* *Quercus ægilops*, another species of oak. The same principle is found in

Lithuanian, *buk-a*.

Russian, *buk-i*.

Slavonic, *buk*;

all describing a tree with edible fruit. In Latin, "*fag-us*," the beech tree, supplies the place of the oak, the emigrants from the east naturally attaching the old names to the forms most similar. The

Irish, *feagh-a*.

Cambrian, *faw-ydd*;

both signify beech tree, and sufficiently indicate their connexion.

In the Teutonic tongues, we have—

Anglo-Saxon, *boc*.

Old High German, *puoch*.

Old Saxon, *buk*.

Holl. *beuk-en*.

Swedish, *bok*.

This is the first stage in the history of the word. "*Bok*" signifies beech-wood, which flourished in the indigenous forests of Europe, and from its smoothness and hardness, was well suited for engraving and carving.

We must now turn to the art of writing as it existed in the early ages of our Teutonic ancestors. Although for the most

It may be explained that by the laws of phonetic change derived from a comparison of numerous instances, "*bh*," in Sanskrit, is represented by "*f*," in Latin, and "*b*," in the Teutonic tongues.

part pre-historic, yet it has left sufficient evidence both in the terms of our language and in its actual remains, to enable us fully to understand its nature. All the modern European alphabets, it is scarcely necessary to mention, are derived from Asia through the Greek and Latin. Before their introduction, the Teutons were not unprovided with a system of letters which served, for all practical purposes, the requirements of those simple times. This was the Runic system of writing, which prevailed from an unknown antiquity, and was continued long after the Christian era.*

The word "runa," in the Teutonic languages, originally signified a mystery, and is derived from the Sanskrit root रु ru, to mutter, to murmur. From the same source proceed the Latin "ru-mor," "ru-gio," "rau-cus," and the Greek ῥύ-ομαι; so in Mat. ch. 4, v. 11—"The mysteries of the kingdom of God;" Gothic, "*runa* thiudangardjos Guths." The writing consisted of characters cut on the sides and edges of small pieces of beech-wood. The novelty of the art imparted to it an air of mystery, which was kept up for the purpose of imposing on the ignorant, and imparting a solemn air to incantations and sorceries. The staffs so employed obtained the general name of "bok-stæf," or "buch-stab;" they also received specific terms, according to the purposes for which the writing was employed, as "run-stæf," when inscribed with magical characters; Old German, "ruog-stab," an indictment or accusation, &c.†

Tacitus, judging doubtless from his own observation, states that the ancient Germans were ignorant of letters, "literarum secreta viri pariter ac fœminæ ignorant;" yet several passages

* Venantius Fortunatus, in the 7th century, writes—

"Barbara fraxineis pingatur rhuna tabellis."

This shews that the ash was occasionally used as well as the "buch," or beech, for writing on.

† Many fine specimens are preserved in the Museum of Northern Antiquities, at Copenhagen.

in his treatise give indications of the existence of the Runic system, of the nature of which he was probably ignorant. He speaks of their veneration for "Aunna," which, doubtless, means the "Alma," or female sorcerers alluded to by Jornandes. He also mentions a mode of divination practised by the use of wooden slips with marks cut on the edges, which, after certain ceremonies, were thrown upon a white sheet, and afterwards taken up and interpreted according to the marks upon them. Nothing could more clearly indicate the original mode of Runic writing than this passage.

When the writing began to be sculptured on stone, the mode adopted of forming letters was that of cutting a representation of the upright staff which formed the letter I, and by cross lines representing the incisions marking the distinctions of the other letters.*

The term "buch-stab," or "bok-staff," thus became equivalent to the Latin "litera," or letter, and is so used in all the Teutonic tongues. Even in English, we find it so employed in the 13th century—

"And tatt he loke well thatt he
An boc staff write twiggess."

Ormish.

There were many systems of letters formed on this principle. They were termed "Futhorcs," from the order in which the letters stood, f, u, th, &c., commencing the list, as a, b, c, do in the ordinary Roman or Phœnician alphabet.

The Roman and Greek alphabets finally prevailed in Western Europe, it is impossible to deny. In the 5th century, Chilperic, king of the Franks, added several letters, and the church finally secured the ascendancy.

Et quod omnes literas Runicas a primâ et elementari similitudine scipionem erectum representat, per similes transversas, partim obliquas partim incurvas oriantur."

In the Gothic language the case was somewhat different. We possess the terms "runa," for mystery, and "boka," and "bokas," for books and writings. Although there can be little doubt that the Runic system prevailed amongst the Goths as amongst the kindred races, yet the earlier introduction of alphabetical writing has obliterated the record of it. The term for writing in Gothic is "meljan," which comes from a root signifying to paint or blacken, equivalent to the Greek *μελας*, black, *μελαινω* to blacken ; German, "malen ;" Swedish "mala." We have the remains of this root in the term "maul-stick," used by the painter to steady his hand. Here there is an entire departure from the primitive idea connecting writing with cutting and engraving in all the other kindred tongues. It seems a fair inference that the term was first applied at the time when Ulphilas translated the Scriptures into the Gothic language, and constructed an alphabet for the purpose. The MS. being doubtless written on parchment, the old term no longer applied, and a word expressive of painting or colouring was more applicable.

The old bok-staf gave way to flat tablets of wood which were called "bokas," and to parchments called "bok-pells," and at length the term settled down in every Teutonic language to the modern "book," "buch," &c.*

The history of this word from its earliest traceable root, in Sanskrit, indicating the simplest animal wants, through its various applications down to its present use, is an epitome of the progress of the human race, and is, perhaps, as suggestive as any word in the English language of the essential identity of the great Aryan family.

* For the purposes of calendars, these "bok-stafs" were continued down to a late period. Borel, in the preface to his "Lexicon Vocum. Antiq. Gallicar," says, "Les paysans se servent encore d'une espèce de hieroglyphiques, en sorte qu'ils font des almanachs sur un morceau de bois, qui n'est pas si grand qu'une carte à jouer, où sont marquez tous les mois et jours de l'année, avec les festes et autres choses notables, par un artifice singulier."

We have a curious glimpse in the habits of our remote ancestors in the terms employed for reading. In the Gothic language, as anciently in the sister tongues, to read and to sing were expressed by the same verb "singvan." Thus, in Luke, iv, 16, where our Lord entered into the synagogue, at Nazareth, and stood up to read, it is rendered "usstoth singvan bokos;" "he stood up to sing the writing." Again in 1st Tim., iv. v. 13, "Till I come give attendance to reading," &c., is rendered, *unte qima gaumei sangva boko*, "attend to the singing of books. The word "redan," equivalent to our "read," meant to think, to comprehend, to counsel. In fact, anciently, reading orally and singing were one and the same thing. Reading was a modulated recitation, and singing was merely recitative.* By the 8th century, the words "redan" and "sigan" had settled down into their modern meaning. In the Anglo-Saxon version of the gospels, Luke, iv, v. 16, is rendered "he arás thæt he rædde."

I might proceed at much greater length. It would be interesting to show from the nomenclature of the most familiar ideas—the parts of the body—the relationships of life—the names of the heavenly bodies, and of the phenomena of nature, and by a large collection of verbs and adjectives predicative of actions, thoughts, feelings, and qualities, embracing a large proportion of those in daily use amongst us—that the Goths stood in very close relationship with our ancestors, but the limits of the present essay will not permit this. With one or two general observations I will bring my remarks to a close.

I have already alluded to the rudeness and imperfection of the Anglo-Saxon language at the earliest period known to us. The deficiency in the inflexions, and in their absence the

* In the services of religion, the musical intonation in reading has maintained its position to the present day. This appears to have been the case amongst the Jews in every age—"Judæi ita pronunciant preces suas, ut potius canere quam dicere. Si dum recitant Textum, non prælegere, sed cantare erant." — *rosgebauer, "De Ceremoniis Judæorum."*

want of suitable auxiliaries and particles to give precision to the meaning, indicate a transition state of degradation from its original inflexional character, without having acquired the compensation afforded by the modern grammatical system. In the Gothic version of the Scriptures, if this character appears at all, it is to a very small extent. The inflexional system, with the exception of the future and some other tenses of the verbs, is as complete as in the Latin, whilst the copiousness of the vocabulary gives great facilities in rendering the niceties of the Greek. The subtle reasonings and abrupt turns in the epistles of St. Paul; the noble bursts of eloquence which occasionally appear, are rendered in the Gothic with a faithfulness and force which are truly astonishing, and indicate a considerable amount of intellectual culture amongst the people speaking the language. Some passages in the Greek text, which depend for their effect on the use of the same word in different senses, have been found very difficult to render, with the proper point, into the modern European tongues. I would instance a passage in the Epistle to the Romans, chap. xii. v. 3, "For I say, through the grace given unto me, to every man that is among you, *not to think of himself more highly than he ought to think*, but to think soberly, according as God has dealt to every man the measure of faith." The original of the clause in Italics runs thus,—
 "μη ὑπερφρονεῖν παρ' ὃ δει φρονεῖν, ἀλλὰ φρονεῖν εἰς τὸ σωφρονεῖν;" the point of the passage lying in the play on the word φρονεῖν, which in our translation is entirely lost. I have met with no translation, in any version, which equals the Gothic in reproducing the delicate shades of the original. It runs thus,—the verb "frathjan," to think, being equivalent to the Greek φρονεῖν,—
 "qitha auk thairh anst Guths, sei gibana ist mis, allaim visandaim in izvis *ni mais-frathjan than skuli-frathjan, ak frathjan du vaila-frathjan*," where the fanciful play of the words is literally reproduced.

There is, occasionally, a poetical grandeur attaching to the derivations and associations of the old Gothic words, which is very striking. Our words "sea" and "soul" are descended respectively from the Gothic "saiv" and "saivala," Anglo-Saxon "sae" and "savl," and there is little doubt of their being derived from a common root. The Latin "anima," and the Greek "ψυχή," mean simply "the breath," and are applied metaphorically to man's immortal part; but in the Gothic term a nobler image is presented. The soul is here the ocean of man's existence, like the sea, in its apparently limitless extent, with its storms and its calms; its sunshine and its gloom; its tides and its currents; and its ever restless, insatiable energy. The conception is bold and forcible, and indicates a deeply reflective turn amongst the people who could embody it in their language.

I have now brought to a close my remarks on the Gothic language. My object has been to shew the essential identity of our own mother tongue, traced through its ancient forms, with the earliest form of the Teutonic which remains to us in the Gothic version of the Scriptures; to prove so far as can be done in so small a compass, that all the modern Teutonic dialects may be traced to a common converging point, which lies very near the Gothic; to indicate from the structure and inflexions of this ancient tongue its analogies with the other members of the great Aryan family, and its points of divergence and departure from them.

I propose, on a future occasion, to enquire how far beyond the Gothic it is possible to trace the elements of our language, or, in other words, what connexion can be shewn to exist between the Teutonic dialects and the ancient Sanskrit roots.

FIFTH ORDINARY MEETING.

ROYAL INSTITUTION, December 15th, 1862.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

Thomas Balman, M.D., was balloted for, and elected a member.

The Rev. H. H. HIGGINS drew attention to a brilliant aurora which he had witnessed on the previous evening.

Dr. COLLINGWOOD exhibited specimens of a very remarkable coal found in the Albert Mine, Hillsborough, New Brunswick, of a very valuable character from the quantity of oil and gas which it contained. It was readily ignited by a candle, and burned with a steady flame, when removed. It has been sold at the pit's mouth at £3 per ton, for making refined petroleum oil, of which it yielded seventy gallons to the ton. It was now selling for ten dollars per ton for gas purposes. The mine was stated to be of a very remarkable geological character, and fish were occasionally found imbedded in the intermediate shales, of which one was exhibited.

Mr. MOORE exhibited a mounted skeleton of an adult male gorilla, from the Gaboon; presented to the Free Public Musuem, by R. B. Walker, Esq., in May, 1862. The dimensions exceed those of any other gorilla skeleton yet recorded; the length of the principal bones being as follows:—

| | | |
|---------------|------------------|---------|
| Humerus | 17 $\frac{1}{2}$ | Inches. |
| Ulna | 14 $\frac{1}{2}$ | „ |
| Radius | 14 $\frac{1}{2}$ | „ |
| Femur | 16 $\frac{1}{2}$ | „ |
| Tibia | 18 $\frac{1}{2}$ | „ |
| Fibula | 11 $\frac{1}{2}$ | „ |

The foregoing dimensions were taken with a rule having one fixed and one sliding arm at right angles to the rule, and consequently measuring the exact distance between the extreme points of each bone.

In the largest gorilla skeleton in the British Museum, an adult male from Paris, the humerus is 17 inches in length, and the femur, $14\frac{1}{2}$; and in Du Chaillu's "King of the Gorillas," in the same collection, the humerus measures $16\frac{1}{4}$, and the femur $13\frac{3}{4}$ inches.*

The PRESIDENT exhibited some new maps of New Zealand, and made some remarks upon the curious natural phenomena of a volcanic character, recently discovered by Dr. Hochstetter.

The SECRETARY then read a paper

"ON MODERN POETS AND THEIR POEMS."

By MR. E. J. REED,

Secretary to the Institute of Naval Architects.

* Vide "Annals and Magazine of Natural History," October, 1861, p. 350.

SIXTH ORDINARY MEETING.

ROYAL INSTITUTION, January 12th, 1863.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

Messrs. J. B. Cros, Ogden Bolton, and Rev. Enoch Mellor, were balloted for, and duly elected members.

The SECRETARY read the following account, by Mr. H. P. Horner, of the brilliant meteor of November 27th last, accompanied by drawings:—

“ Having had a tolerably good view of the brilliant meteor seen at 5 50 p.m., on Thursday, the 27th ultimo, I was led to make a sketch of it, as it seemed to me to bear in many points a strong resemblance to two others I had previously seen—one in the spring of 1835 or '36, and one at 0.57 a.m., on January 1st, 1858; while all three differed much from any others I have seen.

The meteor of the 27th November, 1862, I saw from the Toxteth-park road on my way from town, amid the gas and moonlight, through which, however, it shone brightly. Part of its course was hidden from me by buildings, but the extreme angular space within which, on the whole, I saw it, was about 40° from about S.E. by E. to nearly S. by E. Its elevation above the horizon I estimated at 8° , and its own apparent length 3° . This latter estimate I formed by comparison with the moon's diameter taken as $30'$, and making allowance for the deceptive effect as to size of any object in the sky seen near the horizon. The nucleus, which had so much of stellar radiance as to make its form rather indefinite to the eye, was a bright, bluish white-light, falling away in brilliancy as it merged in the body, passing through a greenish hue and then into yellow, and finally into red at the extremity. Its paler light, in the

line of the axis gave the idea of a hollow flame, and from the extremity of the tail, small portions, like red embers, seemed from time to time to be detached, immediately, however, vanishing, and leaving no visible track.

There appeared a constant flow backwards of flame or light from the head to the tail, and during the time it was concealed from my view, a momentary increase of the light it cast gave me the idea that a sudden blaze or coruscation had occurred; but when again in sight I could not observe any change in its appearance.

It had a slightly declining course, and passed through its own length, I should say, from three and a half to four times in a second. I did not see it disperse or "explode," as it has been said to have done, but lost sight of it in full course behind the neighbouring houses.

The meteor which I saw about 1835 or 1836 fell, apparently, vertically from the zenith to the western horizon about three o'clock, during a bright partial moonlight. It gave little or no impression of having forward or horizontal motion, and passed downward very rapidly, the red and rather ragged tail flickering or waving in its course.

The one seen by me on the morning of January 1st, 1858, appeared from behind clouds to the west, on a night when there was faint, partial moonlight, having, when first seen, an elevation of about 18° , or perhaps, 15° . It had a most imposing appearance from its passing successively behind three strata of cloud, and disappeared at last behind a bank of cloud which seemed to rest on the Carnarvonshire mountains. I found no record of it published, to my surprise, considering its splendour; but when crossing six months later between Dublin and Holyhead, I found, in conversation with an officer in the steamer, that he had seen it; and his description of its size and height when first seen led me to the conclusion that elevation above the earth's surface of about 20

miles ; that it was distant from me about 110, and that its head or nucleus had a diameter of about half a mile. The meteor of the 27th ultimo was seen at Beeston, in Nottinghamshire, at a greater elevation than here, and in the neighbourhood of London,—with them also, having, as far as I can ascertain, a southerly direction.

If it had an apparent elevation there of, say 45° , and at Beeston, one of 11° , it would, according to my estimate of its apparent size, have a length of about twelve miles, a diameter of nucleus of $\frac{3}{4}$ mile, elevation above the earth's surface nearly forty miles, and a speed of about forty miles per second. In speaking of the probable diameter of the nucleus, I allude to the apparent star or blaze, not to the mass of any solid matter which might be present.

My belief is, that the three meteors named are of the same kind, but that the two earlier ones were seen fore-shortened ; and the sketches (since seen) published in the *Illustrated News* of December 6, showing the apparent form of the last at Beeston, confirm me in this opinion, as they closely resemble the shape of those I have described as seen in the years 1835 or 1836, and 1858. A comparison of the apparent length, as compared with the diameter, as seen from different points, might afford a means of ascertaining approximately the *horizontal* direction of the path.

All the three meteors I have described were similar in radiance, transition of colour, and general flame-like character. Though that of last month gave a greater idea of active incandescence than the others, all had the same faintness of light in the line of the axis behind the nucleus, and all passed without leaving any visible train or track, which, in the case of some meteors, as is well known, remains long after the body itself has vanished."

A discussion followed the reading of this communication, in which Dr. NEVINS alluded to the probability that the

meteor in question was one of a class which permanently circle round the sun, and becoming entangled occasionally in the earth's atmosphere, become by degrees burnt up, after successive revolutions.

A paper was then read of which the following is an abstract :—

RIGHT AND WRONG.

By ANDREW COMMINS, LL.D.

THE author reviewed the different causes which produced different conceptions of the same abstract idea in different minds. It is the business of science to remove this confusion by fixing the meaning of the terms which express such abstractions ; and thus to lay the foundation of investigation, and render reasoning profitable. The moral sciences are far behind the physical in this respect, and the very words “right and wrong,” upon which the whole superstructure is built, are still as loosely used as they were in the times of Socrates and Plato. In trying to fix the meaning of an abstract term, the best guide is the original application of it. *Right*, in the primary sense, meant *straight*, direct ; and *wrong*, *crooked*, or indirect. The derivation is the same in nearly all the European languages, both ancient and modern. When men felt the necessity of expressing what was in conformity with rule or command, they used the sensible image of *ruled* or *straight*, and called it figuratively by the same name, *right* ; and when they would express the opposite, they called it *crooked* or *wrong*.

The simple idea of right, therefore, being what is in conformity with some rule or law, and of wrong, that which did not conform to some rules or laws, the first step in the investi-

gation is to determine what are the rules or laws, conformity or discordance with which constitutes right or wrong. He then reviewed the different schools which have endeavoured to ascertain and lay down those laws—the theologians, the moralists, the philosophers, and the lawyers—and shewed the distinction between the law of compulsory action, or positive law, which is the foundation of legal right, and the law of voluntary action, or moral law, which is the rule of moral right. The ultimate basis of positive right is the supreme power of a state ; but what is the ultimate basis of moral right ? Seven different solutions have been given to this question, every one of them supported by the authority of great names. These contending philosophers divided into two great parties, one of which (the moral sense school), including the Stoics, amongst the ancients, and Butler, Grotius, Thomasius, Clarke, Smith, Mackintosh, and Kent, amongst the moderns, who assert that the test of right is conformity to the dictates of conscience, or the moral sense ; and another (the utilitarian school), to which belonged the Epicureans of old, and Hobbes, Hume, Bentham, and Paley, amongst the moderns, who deny the existence of a moral sense, and make general utility the test of right. The author reviewed the arguments used by the upholders of each system, and particularly the objections urged by the utilitarians against their opponents, that the dictates of conscience are not uniform, and that it has no rule to guide it. He laid down the rule of guidance as one that is as universal as the human race, and has been inculcated from the time of Confucius to the present day—the simple Christian principle, to do to others as you would wish they would do to you. The author then considered “right,” in conjunction with the correlative “duty,” observing that one cannot be understood without considering the other, shewing how many evils, both moral, social, and political, arise from an exclusive consi-

deration of either of them. He then concluded by pointing out the mischief which arises from the confusion of rights of different kinds—legal, moral, political, &c., and from having incompatible rights vested in the same individual.

SEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, January 26th, 1863.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

The following gentlemen were balloted for, and duly elected members of the Society :—

Dr. J. de Boehm,
Mr. Richard Johnson, jun.,
Rev. W. C. Green, M.A.,
Andrew Commins, LL.D.,
Mr. J. Abbot, B.A., and
Mr. G. Whitelaw, T. C. D.

The following paper was then read :—

ON
SOME NEW AND HITHERTO UNEXPLAINED
PHENOMENA EXHIBITED BY THE
GYROSCOPE.

By J. BIRKBECK NEVINS, M.D. Lond., V.P.

THE experiments which will form the special subject of the evening, are exhibited by means of a Gyroscope, constructed by Mr. J. W. Wood, of Church-street, Liverpool. He has noticed in this instrument the unusual circumstance that as the rotation of the brass disk slackens in speed, the whole apparatus, *i.e.*, the disk and its supporting ring, instead of beginning to fall, as is usually the case, assumes a gradually more and more erect position, until at length, it has attained a perfectly vertical direction. In this position it revolves upon the summit of the point of support, until the rotation of the disk having ceased it falls to the ground, as in the case of any other body supported merely upon a point. Mr. Wood has constructed two other instruments which act in the same way ; though the difficulty of making them has been such, that he has experienced many failures in each case before he has succeeded in making the apparatus act in this manner. The explanation of the phenomenon, when successful, and the causes of failure in making the apparatus, have not been explained by his friends to whom he has shewn them, and he has, therefore, brought them under my notice.

The first point, clearly, was to be satisfied of the certainty and uniformity of the results above described ; and I have repeated the experiments so frequently that there can be no doubt upon that subject. It appeared to me that a result so

opposite to the usual one must be connected with some peculiarity in the construction of the apparatus, which had, perhaps, been unobserved or thought of no consequence; and this conjecture was strengthened by the circumstance of the repeated failure in making other instruments.

d l



The accompanying drawing, figure 1, exhibits the general appearance of the apparatus, and the method of trying the experiment. It is necessary for its success that the rotating portion of the instrument should be placed on the summit of its support, *u*, at an angle of about 45° . If it is placed in a horizontal position to begin with it does not rise, but simply revolves round the point of support until its speed slackens, when it begins to fall, like any other gyroscope. But if it is placed in the position shewn in the drawing whilst the rotation of the disk, *d*, is very rapid, it gradually becomes more and more erect as its speed diminishes, until at length

the axis, *a b*, is in the same straight line with the upright support, *u* ; and it spins vertically on the edge of the ring, *r, r, r*, with the disk, *d*, in a horizontal direction. The explanation of the experiment appears to me to depend upon the peculiar form of the portion of the ring marked, *s*, fig. 1, which is placed upon the point at the summit of *u*, the supporting stand. Instead of being a mere vertical notch, as shewn in *s*, figure 2, the workman had tooled out with a gouge a sort of cup-shaped cavity, shewn in *s'*, figure 2, without apparently attaching much importance to the circumstance. When, however, the apparatus is put into the proper position, viz., at the angle of about 45° , it is evident that the edge, *p*, figure 3, of this cup presses against the upright, *u* ; and that there will be friction at this point when the gyroscope revolves round its centre of support.

In consequence of this pressure and friction the upright, *u*, will have a tendency to be pushed away from *p*, and if it was free to move it would doubtless recede from *p* ; but since it is fixed upon the table, and therefore cannot move, the body which is able to move will do so, and *p* will have a tendency to recede from *u*. But if any motion occurs it will be in the direction of least resistance ; and it is evident that the summit of *u* has the least resistance to motion in the direction *l, r*, that is, towards the cup-shaped cavity ; the consequence is that *p* recedes from *u*, and the cup-shaped cavity slips over the point of *u*, until it assumes the position *l', r'*, fig. 3 : that is to say, until the ring of the apparatus *r, r, r*, fig. 1 is vertically upon the summit of *u*.

In order to be satisfied that there really is such pressure and friction at *p* as is here mentioned, I blackened by a smoking taper the interior and edge of the cup-shaped cavity ; and the first experiment tried afterwards removed the soot, and shewed the polished brass underneath at the point *p*, where the friction was produced.

The apparatus, fig. 1, and s' , fig. 2, represent the instruments first shewn to me by Mr. Wood, which succeeded perfectly in every case; and he afterwards made an instrument for me which failed to rise in every experiment. On examining the portion s of the new apparatus, the cause of failure appeared to me to be evident. The drawing s'' , fig. 2, represents the socket of that instrument, and if the explanation given above is the correct one, it will be evident that only failure could be looked for from such a socket; for p in that socket could never press against u so as to produce the pressure required; and there is no direction of little resistance similar to that in l, r , fig. 3. When this was pointed out, a cavity was gouged out similar to that in s' , fig. 2, and now the experiment succeeds whenever it is tried.

The effect of rapid rotation in producing stability, as in a common top and in the ordinary gyroscope, is well known; and in accordance with this it is not until the rotation slackens that the instrument perceptibly rises, and if the points of support are carefully oiled, and friction reduced as much as possible, so that the rotation may be very rapid, it is sometimes four or five minutes before it has risen to the vertical position. It appeared to me probable that if the rotation could be rapidly retarded during the course of the experiment it ought to rise more speedily; but the difficulty was to find a means of retarding the rotation, without at the same time exerting a pressure upon the instrument itself, either downwards or sideways, which would introduce a fallacy into the experiment. The object was, however, accomplished by means

of a card, which was made to touch the instrument, fig. 1. Whilst it was rotating very rapidly, it was so thin and flexible to exert any downward pressure, it evidently retarded the speed of the rotation, and the instrument rose rapidly and most speedily gained its vertical position in much less time.

After the experiments above described had been shewn, and illustrated in various ways, the usual experiments with the ordinary gyroscope were exhibited and explained; but this portion of the subject is fully detailed in Professor Hamilton's paper on the gyroscope in vol. xii, 1857-58, of the Transactions of the Literary and Philosophical Society. In the discussion which ensued, several members took a part; and one question asked by Alderman Bennett is here specially introduced, because of the interest which it excited, and because the answer to it has not yet been ascertained. In the ordinary gyroscope, fig. 4, it is well known that if the disk, d, is

rotating rapidly, considerable force is requisite to make the ring r, r, turn upon its gimbals, so as to move the disk from its vertical direction; and it is also well known that if a weight is attached to the extremity of the axis, b, instead of overbalancing the apparatus towards that side, the effect of the weight is to make it revolve upon its support, u, the disk, d,

still retaining its vertical direction as long as the speed of rotation is rapid ; as soon as this slackens, then the weight begins to produce its ordinary effect, and the apparatus is overbalanced and falls to that side. These phenomena and their explanation are sufficiently known ; but Mr. Bennett shewed that if the semi-circular support, *c s*, was firmly held by the two hands so as to prevent any motion in it, then the smallest weight on the end of the axis, *b*, makes the instrument fall over ; and the slightest tap upon the ring, *r, r*, will produce the same effect, whilst a heavy blow upon the ring is powerless to move it, the moment the hands are removed from *c s*, and the instrument is left by itself. Dr. Nevins was not able to give any explanation ; and the experiment is here mentioned, in hopes of eliciting one from some of our readers.

EIGHTH ORDINARY MEETING.

ROYAL INSTITUTION, February 9th, 1863.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

The following members were balloted for and duly elected members of the Society :—Mr. Lionel Ronald, Rev. E. Giles (Huyton), Rev. Nevison Loraine, Mr. William Finlay (Collegiate Institution), Mr. E. Lister, L.R.C.P.E., Mr. J. W. Wood, and Mr. T. A. Hart, M.A.

The following gentlemen were balloted for and elected Associates, on the recommendation of the Council :—Captain J. P. Anderson (Cunard service), Captain John Carr, and Captain E. Pryce.

The Rev. H. H. HIGGINS exhibited and described some interesting Bryozoa of the genera *Catecinella* and *Emma*, found upon roots of seaweeds sent from Hobson's Bay.

Mr. JAMES YATES, F.R.S., hon. member, and vice-president of the International Decimal Association, announced the progress made by the Association towards a metrical system of weights and measures. A system had been recommended by a committee, who congratulate the nation on the fair prospect of a satisfactory and permanent settlement of the question. They proposed that the use of the metric system should be legalised, but without compulsion until sanctioned by the general conviction of the public,—in fact, that it should be publicly sanctioned on all occasions, as well as taught in schools receiving government support.

Dr. IHNE drew attention to an old English word, still extant and in constant use in the north of the island, but totally lost from the literary English. There is no word to express the opposite of *to grudge*, the German *goennen*, but the old genuine Saxon verb *to thoile*, or *thole*, commonly used in Yorkshire in such phrases as "I thoile thee thy pipe." From the same root are the Gothic *thulan*, the Old Saxon *tholôn*, Anglo-Saxon *tholian*, the Norse *thola*, the old High German *doljan*, the modern German *dulden*, and even the Latin *tolero*, and *tollo*, and the Greek *ταλάω* (*talao*). The primary meaning is *to bear*, and from it is formed *thole*, the piece of wood supporting the oar, as well as *thole-pin*. Dr. Ihne expressed his regret that such good, genuine Saxon words, which still lived in the mouth of the people, should be allowed to disappear from the vocabulary, whilst numbers of new words were constantly imported from French and Latin which were ill suited to supply their place.

The following paper was then read :—

NOTES ON ENGLISH GRAMMAR.

By WILLIAM IHNE, PH.D., PRESIDENT.

THE FUTURE TENSE.

No Teutonic language has a simple Future Tense, formed by inflexion from the stem of the verb, like the Future of the Greek, the Latin, and the Romance languages. "There is," says Archdeacon Hare (Philological Museum, vol. ii, p. 218), "an awful, irrepressible, and almost instinctive consciousness of the uncertainty of the Future, and of our own powerlessness over it, which in all cultivated languages has silently and unperceptibly modified the mode of expression with regard to it." Whether this feeling of awe is the real cause of the original want of a Future Tense in certain languages, I do not venture to decide. In Hebrew and Welsh, at any rate, such a feeling could not operate; for there we have a Future, and we lack that Tense which seems the most real of all, viz., the Present. The conception of Futurity cannot be avoided by the rudest of men, and the want of an adequate expression of it is nothing but a defect, which, in the advancing culture of a language, cannot fail to be perceived and to be rectified.

The English language has now a composite Future which may be said to answer all practical purposes. It is formed of the verb, and one or the other of the two auxiliaries. In principal affirmatives, it is used in the first person, both singular and plural, and in the second and third persons, as—
 I will sail, he will sail.
 We will sail, they will sail.

In interrogative sentences, *shall* is used for the first and second persons,* and *will* only for the third, as—

Shall I sail? shalt thou sail? will he sail?

Shall we sail? shall ye sail? will they sail?

In secondary sentences, the use of *shall* and *will* is not quite so clear; at least, in the second and third persons, *shall* and *will* are both used, and sometimes indifferently, as—

(If, that, because, &c.) I shall sail, thou shalt or wilt sail, he shall or will sail.

We shall sail, ye shall or will sail, they shall or will sail.

The reason why, in secondary sentences, there is some uncertainty in the use of *shall* and *will* is partly to be found in the fact, that in such sentences we very generally avoid employing the Future Tense, and use the Present instead. For instance—If you shall sail to-morrow, I shall not see you again. This is quite correct, but we almost invariably say—If you sail to-morrow, I shall not see you again. The verb of the principal sentence is sufficient to extend the conception of Futurity to the secondary verb, which, consequently, can be left in the simple form of the present. Now, as compound Tenses are always clumsy and heavy, we avail ourselves whenever we can of the opportunity of using the Present in secondary sentences, and hence, the feeling which imperatively decides in other sentences between *shall* and *will*, could not grow to sufficient strength in the case of secondary sentences, and form a clear law of language.†

* In the second person there is by no means a perfect agreement. Many use *will* invariably, and cannot be made to see the difference between volition and simple Futurity, which indeed, in some cases, are hardly distinguishable. W. Rushton, Professor of English at Cork (Queen's University), gives (in a private communication) the Interrogative Future as, *wilt thou*, *will you*, which, he says, simply ask for information. It is true, he gives *shalt thou*, *shall you* also, but seems to make no distinction between the use of *shall* and *will* in the second person of the interrogative verb.

† In the conditional future *should* and *would* are employed as follows—1st. In principal sentences, *I should*, *thou wouldst*, *he would*, &c. 2nd. In interrogative sentences, *Should I*, *wouldst thou*, *would he*? 3rd. In secondary sentences, *If I should*, *if thou shouldst*, *if he should*.

I have said that the English Future answers all practical purposes. By saying that, I do not mean, however, that it is perfect. In the first place, a compound Tense is lumbering, slow, and weak, compared with one formed by internal organic change of the root or by termination. "Dedissem" is a more forcible expression than "I should have given;" but this inferiority of the English Future, compared with the Latin or French, is of comparatively little moment. We get accustomed to look upon compound tenses, and to pronounce them, almost as if they were simple; so that often the difference is more a matter of spelling than formation.* But a material objection to the English Future lies in this, that the verbs *shall* and *will* have not entirely lost their original signification, and that, therefore, in many instances, the idea of simple Futurity is troubled and obscured by the admixture of the idea of volition or compulsion. This could easily be avoided if we agreed to restrict *shall* and *will* to their auxiliary functions in the formation of the Future, and to employ other verbs, of which we have ample choice, to express volition or compulsion. But though the tendency of the language seems to be in that direction, this has not been done yet, and we have consequently to put up with a certain degree of indistinctness in the English Future.

In the first person, in affirmative sentences (principal or secondary), there is no doubt whatever, that *shall* means Futurity alone. It has stripped off all idea of obligation and necessity. If we wish to express this (the German *ich soll*) we say, "I am to sail, we have to work, I must, ought, am obliged," &c.; but never "I or we shall." In interrogative sentences, however, there is uncertainty. "Shall I die, doctor?" asks the desponding patient. He means simple Futurity. "Shall I die for you?" exclaims the despairing lover on his

* The French Future is compounded with the infinitive, and the verb avoir, only the French do not spell *je parler ai, tu parler as, il parler a*, but *je parlerai, tu parleras, il parlera*.

knees. "Shall I bring up the pudding?" says the servant. Here simple Futurity is out of the question; it is order and compulsion that are implied. The Scotch, evidently, here have the advantage over the English. They use *will* to express the future, and *shall* to express obligation—"Will I die, doctor; will I have any more pain?" and on the other hand, "Shall I knock his head off?"

In the second person the simple Future is expressed in affirmative principal sentences by *will*, and in interrogative sentences by *shall*, as, *you will sail; shall you sail?* If we say, *you shall sail*, we express an order, and if we say, *will you sail?* we mean to ask if there is an intention, at least, if we are very accurate and precise in our expression. But I have observed that a great many writers and speakers are in the habit of using *will you*, where *shall you* is more correct, viz., where no volition is implied.

To express volition in affirmative sentences, we either use some other verb, such as *intend*, *wish*, or we lay a stress on *will*, as, "In spite of warning, you *will* continue your evil practices." This stress is a sufficient distinction. If it is not apparent in writing or printing it is the fault of our imperfect orthography. If we wish to express obligation interrogatively (the German *sollst du*), we never say, *shall you?* but we take the same verbs as in the first person, are you to sail? have you to work? must, ought you, are you obliged? &c.

In secondary sentences, as we have remarked above, there is some degree of indefiniteness in the use of *shall* and *will*. Sir E. Head says (*shall and will*, p. 2)—"The practice with the second person in oblique sentences does not seem quite clear." The tendency now is, I believe, to say *will*, in all cases, or to use the Present Tense. The Prayer Book has—"We believe that thou *shalt* come." The more current expression now would be—"We believe that thou *wilt* come." "We hope you will recover," is said by everybody. Nobody thinks

of saying—"We hope you *shall* recover." Sir E. Head considers the following two sentences equally correct—"You think you shall do it," and "you think you will do it." Granted that they are equally correct, I believe nine persons out of ten say *will*; and certainly *shall* will not do, unless the subject of the principal sentence is *you*. We cannot say—I, or we think you *shall* do it. It must be—I think you *will* do it. The use of *shall* in such secondary sentences, which have the same subject as the principal sentence, is a notable peculiarity, and will be adverted to again, when we speak of the third person. It is a remnant of antiquity, and seems destined to be swept away soon.

"If you shall insist, I will obey," is certainly correct; but again, I believe that most people would prefer saying—"If you insist, I will obey," because, as I remarked before, in a secondary sentence the simple present is preferred. The use of *should* and *would* in secondary sentences is by no means very clearly established, and often depends upon an indescribable and indefinable feeling of their relative appropriateness. "You said you should be in town on Saturday," is quite correct, but so is, "You said you would be in town on Saturday;" and it is imperative to use *would*, if the subject of the principal sentence is altered. Again, "you thought you *would* die," and "you said you *should* die." What is the difference? I believe that in all these cases *will* and *would* are striving for mastery with *shall* and *should*, and that the tendency of the language is to favor the former.

We come now to speak of the third person in the three different kinds of sentences, affirmative, interrogative, and secondary. Here we find *will* and *would* established throughout, except in certain kinds of dependent clauses. We say, *he will sail, will he sail? the ship that will sail to-morrow.*

As in the second person, we can, by laying a stress on *will*, convert the auxiliary into a verb implying volition. "He

will blunder, though I caution him ever so much." " *Will* you be attentive to your work ? " " A man that *will* make a fool of himself deserves no pity." The emphasis is enough to mark the difference in the meaning of *will*, and if it were felt to be desirable, this difference could easily be indicated in writing.

In some secondary clauses *shall* is substituted for *will*, viz., when the subject of the secondary clause is the same as that of the principal, *e.g.*, " the captain thinks he *shall* sail to-morrow." Here *he*, the subject of the second sentence, is identical with *captain*, the subject of the first. If we substitute some other subject in the first clause, the *shall* of the second becomes *will*, *e.g.*, " My brother thinks the captain *will* sail to-morrow." Moreover, in some adverbial sentences *shall* and *should* are necessary. " Whenever (or *if, provided*) it *shall* happen that, &c. If it should be found out." This seems to be owing to the hypothetical nature of these sentences. We should use *will* and *would* in other adverbial clauses, as, " Because he will be found out ; because he would fail. I can tell you when he *will* arrive. We did not know when he *would* arrive. He labours so diligently that he *will* be sure to succeed."

Upon the whole, then, as we have seen, there is no great practical difficulty in distinguishing between the cases where *shall* and those where *will* is required. The difficulty is confined to those instances where either one or the other may be used, and where only grammatical over-refinement can establish a fundamental difference, or where the Present Tense is commonly used for the Future.* It is curious that many

* In the town of Liverpool, the correct use of *shall* and *will* is, however, by no means universal even in the case of persons born and bred here. This is probably caused by the considerable number of Scotch and Irish residents. I have particularly observed that mistakes are common and difficult to eradicate in the children of Scotch and Irish families. But even professional men, though of English descent and education, have occasionally their feeling of grammatical accuracy blunted by the intercourse with persons who speak incorrectly.

Latin grammars retained till lately, or still retain, the practice of rendering the Latin Future in all persons by *shall* and *will*. For instance, the Eton Latin Grammar (edition, 1838) has

Audiam, I shall or will hear.

Audies, thou shalt or will hear.

Audiet, he shall or will hear.

The edition of 1861 has, *I shall hear, thou wilt, he will hear*. When the alteration was made I cannot now ascertain. How is it, then, that only in England proper the use of *shall* and *will* is thoroughly understood and practised without error? The Scotch, the Irish, and to a great extent, also, the Americans, constantly use *will* in the first person, where we use *shall*, as—"I will be obliged to you, if you lend me £5." "*Will* I die, doctor?" "*Will* I have any more pain?" &c.

Everybody knows the jocular taunt thrown at our northern and western neighbours. It is stated that they would say—"I will be drowned and nobody shall save me." I am assured by my Scottish friends that the second part of this phrase is not good Scotch, and that they would use *will* and not *shall*. They invariably use *will* to express Futurity, and *shall* to express obligation, and for this they are ridiculed by all patriotic Englishmen, and they are pronounced to be actually backward in civilisation and good breeding. Archdeacon Hare says (Phil. Mus. ii, 218)—"Our Future, or at least what answers to it, is *I shall, thou wilt, he will*. When speaking in the first person, we speak submissively; when speaking to or of another, we speak courteously. In our older writers, for instance in our translation of the Bible, *shall* is applied to all three persons; we had not then reached that stage of politeness which shrinks from the appearance even of speaking compulsorily of another. On the other hand, the Scotch use *will* in the first person; that is, as a nation, they have not acquired that particular shade of good breeding which shrinks from thrusting itself forward."

Now, this is rather a serious charge. The bulk of the Scotch, in the middle of the nineteenth century, and even some of their most eminent writers are here supposed not to be so far advanced in general good breeding and politeness as the English were more than 300 years ago, and that in spite of the good example that has been set them for such a long time. They have not only been unable to find out for themselves how they ought to speak politely, "without thrusting themselves forward," but, when they have been told, they have not the sense to see it, and they *will* persist to be rude.

I confess I can hardly treat such an argument seriously. I fail to perceive the politeness of a man who says, "I shall be obliged, if you lend me £5," or the rudeness of another who says, "I will be obliged." The *shall* and *will* have nothing whatever to do with politeness or the want of politeness. It is not in these words, but in what accompanies them that we can show our good breeding. Grammatical forms are quite independent of such considerations.

The fact is, the Scotch went one way in forming the modern Future, the English went another. If Scotland had been the seat of government; of the court; of the capital of Great Britain, we should have adopted the northern practice, as now we follow the southern. In itself the one is as good as the other; but, as England has acquired the lion's share in grammatical as well as political legislation, the Scotch must simply bow to the majority, and add another to the long list of grievances under which they suffer.

The English Future, in Wiclif's time, was formed exclusively by *shall*. It is quite possible to show a few faint traces of the introduction of *will* in Chaucer, and, perhaps, some other writers of the time. But in Wiclif's Bible I can discover only *shall*. Now, this was found to be, in some instances, very inconvenient, as *shall* retained its meaning of obligation, besides serving to form the future. I believe that

the inconvenience began to be felt when popular preaching in the vernacular became more common. The preachers had necessarily to deal largely in religious and moral injunctions. "Thou shalt not steal; thou shalt not commit adultery." As long as such commandments could be interpreted as Future tenses, the preachers would fail to produce the desired effect. They had, therefore, either to substitute another word to convey the idea of obligation, or the future had to be expressed by some other auxiliary. If the old Saxon word *weorthan* had been preserved, and used like the German *werden*, to express the future, the problem would have been solved in a most satisfactory way, as it was in German.

But, unfortunately, *will* was employed, and now the Scotch went to work in a more systematic way, and used *will* throughout. The English, faithful to their national character, did not care about regularity and symmetry. As in everything else, they made a compromise between the old and the new. They preserved the *shall* in the first person, because the notion of commanding one's self could not be entertained, just as the imperative mood has no first person. In the second and third person they substituted *will*. In questions the *shall* was even serviceable in the second person, because if a question is asked, it cannot be mistaken for a command. In secondary sentences the *shall* was not so much restricted by the *will*, because the comparatively rare use of the Future in secondary sentences did not work out a decided general feeling and unanimity. On the whole, the words *shall* and *will*, *should* and *would*, retained more of their primitive meaning in these secondary sentences; but now, in the time of grammarians, who lay down positive rules, it is not unlikely that we shall see the secondary sentences more and more brought under the same law as the principal sentences.

It is interesting to watch the gradual introduction of the ~~modern~~ future. It can be most satisfactorily traced in the

successive translations of the Bible. Wiclif, as I have already stated, invariably uses *shall*, but none of the succeeding translators follow his example. Whenever the Greek Future can be conceived to contain the idea of volition, they more or less use *will*, even in the first person;* but they are by no means agreed among themselves, and often the same translator seems to waver in the use of the two auxiliaries. It will be interesting to adduce a few examples.

The Prayer Book translation of Psalm xviii., v. 25, runs thus:

"25. With the holy thou *shalt* be holy: and with a perfect man thou *shalt* be perfect. 26. With the clean thou *shalt* be clean: and with the froward thou *shalt* learn frowardness. 27. For thou *shalt* save the people that are in adversity: and *shalt* bring down the high looks of the proud. 28. Thou also *shalt* light my candle: the Lord my God *shall* make my darkness to be light."

The authorized version has,

"25. With the merciful thou *wilt* show thyself merciful: with an upright man thou *wilt* show thyself upright. 26. With the pure thou *wilt* show thyself pure: and with the froward thou *wilt* show thyself froward. 27. For thou *wilt* save the afflicted people: but *wilt* bring down high looks. 28. For thou *wilt* light my candle: the Lord, my God, *will* enlighten my darkness."

Here is a complete change in less than half a century, (from 1568 to 1611.) But it appears the translator of the Prayer Book lagged rather behind his time, as will be seen from a comparison of Tyndale's (1535), Crapmer's (1539), the Geneva

* For instance, Matt. iv. 9, Wiclif translates, "All these I shall give (*δώσω*) to thee." All the other translators have "I will give," which is more an interpretation than a translation of the original. Matt. vi. 21. "For where your treasure is, there will your heart be (*ἔσται*) also." No translator here has *shall*. Wiclif uses the present tense *is*. Possibly he intentionally avoided *shall*, as it might have conveyed the notion of command. So also the Rheims version. The other translators have *will*, by which, very appropriately, the idea was imparted to the text, that the heart *inclines* to be with its treasure. No such reasoning, however, prevented the use of *shall* in the following verse, (22.) "The light of the body is the eye: if, therefore, thine eye be single, thy whole body *shall* be full of light." Here all translators have *shall*.

On the other hand, the Greek Future was rendered sometimes by *shall* on purpose to convey the idea of obligation, as *μεριμνήσει*, (Luther, *wird-sorgen*;) in Matt. vi. 34. "The morrow *shall* take thought for the things of itself." Tyndale goes even further, and says, "Let the morrow care for itself;" which is going beyond the province of a translator.

Bible (1557), and the Rheims Bible (1582). I quote from the authorized version, Matthew iii., 11 :

"But he that *cometh* (1) after me, is mightier than I, whose shoes I am not worthy to bear; he *shall* (2) baptize (βαπτίσει) you with the Holy Ghost and with fire. Whose fan is in his hand, and he *will* (3) thoroughly purge (διακαθαρίει) his floor, and gather (4) (συνάξει) his wheat into the garner; but *will* (5) burn up (κατακαύσει) the chaff with unquenchable fire."

Wiclif, of course, renders all the Greek futures by *shall*. Tyndale has *shall* only once, viz., he *shall* (2) baptize (like the authorized version). Cranmer has *shall* twice, viz., *shall* (2) come, and *shall* (2) baptize. The Geneva Bible, agreeing with Tyndale, has *shall* once, viz., he *shall* (2) baptize. The Rheims Bible has *shall* three times, viz., *shall* (1) come, *shall* (2) baptize, *shall* (3) clean purge, and *will* twice, viz., *will* (4) gather, *will* (5) burn.

Here we can distinctly discover a state of transition, and unsettled usage. The authorized version itself is here, as elsewhere, at variance with itself; for instance, Psalm v. 6,

"Thou *shalt* destroy them that speak leasing: the Lord *will* abhor the bloody and deceitful man."

Here we see the Future in the second person, expressed by *shall*; but in the same Psalm, v. 12, it is rendered by *will*:

"For thou, Lord, *wilt* bless the righteous; with favour *wilt* thou compass him as with a shield."

Curiously enough, the Prayer Book agrees with the authorized version, thus showing that, in 1568, the interregnum, if I can call it so, had already begun. Matt. vi. 4:—

"And thy Father, which seeth in secret, himself *shall* reward thee openly."

This is evidently the simple Future, and ought to have been translated by *will* reward; but the Rheims translation alone has "*will* repay thee." Matt. vi. 14:—

"For if ye *forgive* (1) men their trespasses, your Heavenly Father *will* (2) also forgive you; but if ye *forgive* (3) not men their trespasses, neither *will* (4) your Father forgive your trespasses."

We have here four verbs, (1) if ye forgive; (2) he will for-

give ; (3) if ye forgive not ; (4) neither will he forgive. It is curious to see how these four verbs have been handled by the different translators.

Wiclif has the present tense in (1) and (3), like the authorized version ; but *shall* in (2) and (4). Tyndale has *shall*, in (1) (2) and (4) ; *will*, in (3.) Cranmer has the present tense in (1) ; *shall*, in (2) and (4) ; *will*, in (3.) The Geneva Bible agrees with the authorized version. The Rheims Bible has *will* in all the four cases.

If we carefully compare this passage with Matt. iii. 11, quoted above, we see that the translators had no fixed rule, or even predilection in the use of *shall* and *will*. For instance, whereas, in the former, Tyndale and Cranmer favor *will*, in the latter they favor *shall*, and the Rheims translation does just the reverse.

It is unnecessary to produce more evidence to prove that, in the age of the Reformation, the present form of the Future was not yet elaborated, and acknowledged by the several translators of the Scriptures. Other writers are equally at variance with the modern use. Ascham writes—

“The scholar *shall* win nothing by paraphrases.”

Hooker says—

“No ; I *will* not be afraid to say unto a Pope or Cardinal, in this plight.”

This is clearly Scotch. We find this even in Shakspeare. For instance, in the Merchant of Venice, I. 3—

Bassanio—“You shall not seal to such a bond for me.”

Antonio—“Why, fear not, man, I *will* not forfeit it.”

It would be absurd for Antonio emphatically to deny that he *intended* forfeiting the bond. He means to say, that the contingency which could make him forfeit it, is not at all likely to arise.

Merchant of Venice, II. 3. Jessica says to Launcelot, who is going to wait upon his new master—

“And, Launcelot, soon at supper *shalt* thou see Lorenzo.”

Measure for Measure, iv, 1. "May be *I will* call upon you anon."

Merry Wives, iii, 3. "I'll warrant *we'll* unkennel the fox."

Merry Wives, i, 1. "I am of the church, and *will be* glad to do my benevolence to make atonements and compromises between you."

Merry Wives, i, 1. "I hope, sir, *I will do*, as it shall become one that it would do reason."

Merry Wives, i, 3. "It is a life that I have desired; *I will* thrive."

Merry Wives, i, 3. "We *will* thrive, lads, we *will* thrive."

Merry Wives, ii, 2. "See the hell of having a false woman! my bed *shall* be abused, my coffers ransacked."

Measure for Measure, iii, 1. "Be absolute for death; either death or life *shall* thereby be the sweeter."

King Henry VI. 1st pt., i, 1. "Henry is dead and never *shall* revive."

Merchant of Venice, iii, 2. "Look on beauty, and you *shall* see it is purchased by the weight."

Ibid., iii, 1. "Our feast *shall* be much honoured in your marriage."

Ibid., iv, 1. "I'll take no more;

And you in love *shall* not deny me this."

Ibid., i, 3. "If he should offer to choose, and choose the right casket, you *should* refuse to perform your father's will, if you should refuse to accept him."

Here *should refuse* stands for the modern *would refuse*.

Ibid., iii. "Besides it *should* appear."

The use of *should* in such sentences has survived to the present day, so much so, that I am doubtful, if it is not more correct than *would*.

Merry Wives, ii, 4. "If he had been thoroughly moved, you *should* have heard him so loud and so melancholy."

2nd part, Henry VI, iii, 1. "*Glo.* Why, 'tis well known that whilst I was protector pity was all the fault that was in me; For I *should* melt at an offender's tears, and lowly words were ransom for their faults."

Hundreds of examples might be added from Shakspeare, to prove that his use of *shall* and *will* had not yet settled down to what we now consider correct. I cannot understand, how Sir E. Head,* taking only one passage (Hamlet V. 2), which he found quoted by Mr. Guest,† tries to explain it away, and how he can fancy he has thereby proved that Shakspeare has

* Shall and will, p. 14.

† Transactions of the Philol. Society, March 13, 1846.

quite adopted the modern future. Sir E. Head has evidently not taken the trouble to look over a single play of Shakspeare, to ascertain what were the facts.

EITHER.

There seems to be considerable uncertainty in the use and meaning of *either*. It is of Anglo-Saxon origin. *Aegtha* means *each* or *both*. But it seems early to have been confounded with the Latin *alter*, (French, *autre*,) and to have been used in the sense of *one* or the *other*, like the Latin *alteruter*. Bishop Lowth in his "Introduction to English Grammar," (p. 116,) condemns it in the following sentences:— 2 Chron. xviii, 9, "The king of Israel and Jehoshaphat king of Judah sat *either* of them on his throne." He recommends *each* instead, and no doubt, correctly. Levit. x. 1, "Nadab and Abihu, the sons of Aaron, took *either* of them his censer." 1 Kings vii. 15, "For he cast two pillars of brass, of eighteen cubits high apiece: and a line of twelve cubits did compass *either* of them about." Bishop Lowth says, "*Each* signifies *both of them*, taken distinctively, or separately: *either* properly signifies only *the one or the other*," for which reason the like expression in the following passages seems also improper: "They crucified two other with him, on *either* side one, and Jesus in the midst." John xix. 19. [Wiclif, oon on this side and oon on that side.] "Of *either* side of the river was there the tree of life." Rev. xxii, 2. [Wiclif, on eche side.] 1 Kings x, 19. "Proposals for a truce between the ladies of *either* party." Addison, Freeholder, 38.

In all the instances here quoted, *each* would be so far better than *either*, as it would not admit of any mistake. *Either* in the meaning *the one or the other*, is used most emphatically in what would be called a "locus classicus" in a dead language, by Milton, Par. L., I., 423, where he says, that—

"Spirits, when
They please, can *either* sex assume or both."

Here *either* must mean not *the one* AND *the other*, but *the one* OR *the other*; otherwise *both* has no meaning. But in other passages, Milton clearly uses the word in the sense of *each*, i. e. *both of them*; as, Par. L., V, 130—

“She silently a gentle tear let fall
From *either* eye, and wiped *them* with her hair.”

A tear from each eye, justifies the plural *them*. Again, Par. L., XII, 636—

“In *either* hand the hastening Angel
Caught our lingering parents.”

This passage, I confess, is very puzzling. *Either* must mean not *the one* OR *the other*, but *the one* AND *the other*; that is, both of them taken distinctively or separately. This being the case, the object ought also to have been expressed distinctively and separately: he caught in either hand *one* lingering parent. I do not, however, recommend this reading either on critical or æsthetic grounds.

The present practice in the use of *either* is still very unsettled. By some it is used for *any one*; for instance, “Which of these ten books do you like?” “I do not like *either*,” or, “I want *neither*.” This is utterly bad grammar.

• It is clear we must confine the word to one of the two significations, the Latin *alteruter*, or *uterque*. It cannot retain both without detriment to the language. Now, although the signification *uterque* is the oldest, the other has taken its place in the majority of cases, so that I agree with Bishop Lowth’s canon.* “On which side will you sit, on the right or on the left?” “On *either*.” “Will you occupy the right side or the left?” “Both.” This is clear language and correct grammar. It is further confirmed by the adverbial use of *either*, as: “*Either* say yes or no.”

* Shakspeare uses it thus: *Anth. & Cleop.*:

“Lepidus flatters both,
Of both is flattered; but he neither loves,
Nor *either* cares for him,”

EACH.

Each is the singular number and ought never to be used as a plural. Yet it often is found connected with the plural verb. For instance in the above quoted passage :

“ Let *each* esteem other better than *themselves*.”

It ought to be : “ better than himself.” Milton Par. L., V, 477—

“ Each in their several active spheres assigned.”

The same mistake is made with words of similar signification, as “ every one,” and “ any one,” in spite of the warning voice “*one*.” Bentley, Dissert. on Themistocles’ Epistles, Lect, II—“ It is observable, that *every one* of the letters *bear* date after his banishment, and *contain* a complete narrative of all his story afterwards.” So also : “ He forgave every one *their* sins.” Addison, Spect. 25—“ I do not mean, that I think *any one* to blame for taking due care of *their* health.”

In spite of Addison’s authority, and the very frequent use of the plural with *each*, there can be no doubt that it is faulty, as for example in the following passages :

“ *Each* of us had reasons for *our* opinions best known to *ourselves*.” (Goldsmith.)

“ I shall venture to mention some qualities, *every one* of which *are* in a pretty high degree necessary to this order of historians.”—(Fielding.)

“ And so indeed may *any one*; for I know the captain will well reward *them* for it.”—(Fielding.)

Similarly *neither* is incorrectly used as a plural noun, as—

“ *Neither* of them *are* remarkable for precision.”—(Blair.)

There is a very peculiar use of *each* in the common versions of Euclid—“ If two sides of one triangle be equal to two sides of another, each to each, &c.” This is perfectly absurd. For if a and b be equal to α and β each to each, then $a = \alpha = \beta$ and $b = \alpha = \beta$, i.e., each of the former to each of the latter, which will make them all the same size. The word which ought to be used is “*respectively*.” This would imply $a = \alpha$, $b = \beta$. Just so we have the banns published when

more than one couple are named: "If any of you know cause or just impediment, why these persons should not be joined together—*respectively*—in holy matrimony, ye are to declare it." What awful result would follow, if the four or six persons were to be joined *each* to *each*? It might be supposed to be something like the promiscuous conjugal life of the Ancient Britons of whom Cæsar says, that a certain number of men married a certain number of women on communistic principles, discarding the idea of individual and peculiar rights.

I have endeavoured so far to trace the growth of the present English Future Tense, to account for its origin, to point out in what respect it is defective and where its use is still unsettled and likely to undergo further change. As for laying down practical rules, it is for an Englishman as unnecessary as it is difficult. For a thorough Scotchman it would be utterly useless, not because he is ill-bred or illiterate, but because he is from his birth accustomed to another formation of the Future verb, which not without a show of reason he may maintain to be as good as the English in itself. As for foreigners, I believe that they have no great difficulty in acquiring the proper use of *shall* and *will*, provided they make their studies of English on the south side of the Tweed.

OTHER AND OTHERS.

Other, as an Adjective when followed by a Substantive, takes no s in the plural: "Other lords besides thee have had dominion over us."

When used substantively it takes the plural sign, as—

Psalm xlix, 10. "The fool and brutal person die and leave their wealth to others." (Authorized version.)

Matthew v. "What do ye more than others."

Ephesians ii, "We were children of wrath even as others."

Yet this plural form seems by no means to be fully established. We often find the plural without an s, for instance:

in the Prayer-book translation of the above-quoted Psalm xlix, 10, we read—"and leave their riches for *other*."

Philip. ii. 3. "Let each esteem other better than themselves."
(Cranmer translates *another*.)

Shakspeare. Merchant of Venice, I, 1—

"Nature hath framed strange fellows in her time;
Some that will evermore peep through their eyes, * *
And *other* of such vinegar aspect," &c.

Dryden. Satire of Juvenal—

"One sends him marble * * * and one the work of Polyclete * *
while *other* images for altars give."

This is now quite obsolete. But the question arises whether *other* should have an s in the plural when it is not a Substantive of the masculine gender, but a simple Adjective to which a Substantive is to be supplied, for instance—Matt. xiii, 4. "Some seeds fell by the way side . . . 8. But *other* fell into good ground." There seems to be a difficulty in this use of the word. All the other translators avoid it. Wiclif says: "other seedis." The Rheims version has "othersome."* The Geneva and Cranmer have "some," Tyndale "part."

The modern practice is to add the s; for instance—"Some books are useful, others entertaining." This was not usual formerly. Shakspeare says, Measure for Measure, iv. 4—

"Every letter he hath writ, hath disvouched other."

Ibid. iv, 5. "There's other of our friends."

Even living writers adhere to this use, as Dean Milman in his Memoir of Lord Macaulay—

"He lies at the foot of Addison's statue near to Johnson, and among many *other* of our most famous statesmen and men of letters."

Nothing else, nihil aliud, is in Shakspeare often found expressed by *no other*. Measure for Measure, v. 1—

"If she be mad (as I believe no other),
Her madness hath the oddest frame of sense."

* *Othersome* is found also in Shakspeare, Measure for Measure, iii, 2—"Some say he is with the Emperor of Russia; other some, he is in Rome."

2nd part King Henry 6th, iii. 2—

“ That when the King comes, he may perceive
No *other* but that he died of his own accord.

A. Trollope.—In no guise did he look *other* than a clever man.

THE ADJECTIVE.

Apart from such Adjectives, that are occasionally transformed into substantives, there are others, which become substantives with specific significations. They do not preserve the whole range of their meaning as Adjectives, but are restricted to a narrower limit. Such words are, to name a few—“ Goods,” not all things good, but a special kind. “ The wilds,” not all things wild, but wild countries. “ Blacks,” are not all persons black, but a specified class. Many things are green, without being “ greens.” “ A flat ” is a particular kind of flat boat ; “ flats ” are level plains ; “ flats and sharps ” are restricted to music. So only one class of small things comes under the head of “ smalls ” ; not all things new are “ news ” ; or all things long or short, “ longs or shorts.”

The list of such substantives which are originally Adjectives is very long, but yet clearly defined, so that we are not at liberty to coin new ones ; it includes—mortals, ancients, straits, levels, ills, evils, colds, elders, betters, seniors, juniors, savages, innocents, the open, the deep, the narrows, the rapids, the shallows, valuables,—to which may be added some words not originally Adjectives, as the *ins* and *outs*, the *ups* and *downs*. All these words assume the characteristic mark of substantives, the *s* of the plural. In some of them we can trace the gradual transition from the Adjective to the substantive character, when we find the same word sometimes with, and sometimes without the plural *s*, e. g., the heathens and the heathen.

The words hitherto referred to, though originally Adjectives, have become substantives in every way, in form and meaning, and should be enumerated in dictionaries as such.*

*v, 15, is translated : “ Yea the very *objects* (μάστιγες ?) came against

But every Adjective in the language can, under certain circumstances, be used substantively. It is with these that I specially propose to deal.

The English language has, in the article, the grammatical instrument, by which an Adjective can be raised to the rank of a substantive, but as the article has no different forms for the genders, this process can only take place under certain limitations. It is restricted to the following two cases :

1. To designate a noun of the neuter gender, singular number.
2. To designate a noun of the masculine or common gender and plural number. We say :—

The *evil* that men do lives after them ;
The *good* is oft interred with their bones.

Meaning *malum*, *bonum*,—*das Boese*, *das Gute*.

Milton, *Parad. L.*, II, 278—speaks of “the *sensible* of pain.” Shakspeare, 2 P. King Henry VI, I, 4—“Deep night, dark night, the *silent* of the night.” Milton freely adds qualifying words to such Adjective nouns, as *Parad. L.*, II, 97—

“ His utmost ire * * *
Will * * * reduce
To nothing *THIS essential*.”

Parad. L., II, 406—

“ Who shall * * *
Through the *PALPABLE obscure* find out
His uncouth way ; * * *
Upborn with indefatigable wings
Over *the vast abrupt*.”

This might be done legitimately with every Adjective, but, from the want of all adjectival inflections, and from an instinctive aversion of the English language to a prevalence of abstract nouns, and I might add of the English mind to abstract ideas, the use made of this grammatical law is very limited.

The second transformation of Adjectives in nouns of masculine or common gender and plural number is much more frequent, as : "Thou hast broken the teeth of the ungodly." Yet even here we mostly prefer adding a substantive, and it is not difficult to show that the English language long evaded the use of such Adjectives ; for instance, Matthew ix, 12—"They that be whole need not a physician, but they that are sick." The words of the original, *οἱ ὑγιῆντες* and *οἱ κακῶς ἔχοντες*, might have been translated by the Adjectives thus : The whole need not a physician, but the sick ; but only Tyndale and the Geneva version have the Adjective "whole" used substantively, and no translator has "sick" in that form. Wiclif has "men that faren wel," and "men that be yvel at ease." Cranmer translates "they that be strong, they that be sick." The Rheims translation has "they that are in health," and "they that are ill at ease," thus avoiding the use of the simple Adjective by a circumlocution.

The rule which confines the Adjective used substantively for the nouns of masculine or common gender to the plural is now strictly adhered to. But in older writers numerous deviations from it are found ; for instance, Psalm x, 2—

"The *wicked* in *his* pride, does persecute the poor." 3. "For the *wicked boasteth* of his heart's desire, and *blesseth* the covetous." 14. "The *poor committeth* himself unto thee."

Verse 15, in the Prayer Book, v. 17—

"Break thou the power of the *ungodly* and *malicious*, take away *his* ungodliness."

The last verse is rendered by the authorised version :—

m of the wicked and evil man : seek out *his*

substantive *man* shows the awakening
ical propriety, which felt ill at ease in
rithout a noun in the singular number in

Other instances are Psalm xxxvi, 1—

"My heart sheweth me the wickedness of the *ungodly*: that there is no fear of God before *his* eyes."

Psalm v, 12—and many more passages.

The Adjectives limited in their use as substantives to the plural masculine or common, labour under other disabilities which show that they are to some extent intruders and aliens in the ranks of native substantives; they cannot take into their service determining and qualifying words like other substantives.* We can speak of the *godly* and *the ungodly*, but we cannot distinguish *these godly*, from those *ungodly*; we can speak of the *bold* and the *brave*, but not of *many bold*, or *few brave*.

Yet Lord Byron has the following passage, (Sardanap. V.)

Myrrha—"These men were honest; it is comfort still
That our last looks should be on honest faces.

Sardanapalus—And lovely ones, *my beautiful*."

Shakspeare, *Midsummer N. D.*, I, 1—

"Demetrius loves *your fair*."

Shakspeare, *Measure for Measure*, II, 4—

"As for you

Say what you can, *my false* o'erweighs *your true*."

2 Thessalonians ii, 8—

"And then shall *that wicked* be revealed." (ὁ ἄνομος.)

Tennyson, *Enid*.—

"Died the death

Themselves had wrought on many an innocent."

In order to do this we must add a formal substantive to the Adjective, and we have recourse to the pronoun *one*. This serves as it were as a guaranty and a stamp, that the Adjective has really substantive value, or rather it stands itself as the formal representative of a noun, and therefore leaves the Adjective in its original grammatical function. We *can* say,

* The Neuter Singular may be qualified by determining words, e.g., *much good*, *this good* he has done me, &c. *What good?* *A universal good*. See the passages of Milton quoted above, *Parad. Lost*, II, 97, 406.

many bold ones, few brave ones, and we do say so ; but it cannot be affirmed that we like saying so.

There is an evident impression in modern writers and in good society, that this use of *one*, and especially of its plural *ones*, is clumsy, inelegant, and to be avoided. It is in fact dying out, and justly so, for it is very objectionable. We either supply it by a *bonâ fide* substantive and thus make the expression more concrete and clear, or we leave it out and let the Adjective take its chance of being understood without. I hardly think any modern writer will pen any thing like the following passage, which is taken from the Preface to the Authorised Version of the Bible : “ We never thought from the beginning, that we should need to make a new translation, nor yet to make a bad *one* a good *one*, but to make a good *one* better, or out of many good *ones* one principal good *one*, not justly to be excepted against.”

This is evidently an instance which shows, that the English language has really lost something by dropping all inflexions in the Adjective. In German, as in Greek, the Adjective is far more freely used as a substantive, and this is not only useful in common conversation, but also in the language of Poetry as well as of Philosophy. “ Durch das Schöne stets das Gute,” is hardly well translated, by “ the good always through the beautiful.” But especially difficult is the rendering of the feminine Adjective used substantively, e.g., “ Ach die Aermste, die in der Wiege Königin schon war ” ; “ Alas ! the wretched one, who from her cradle was a queen.” “ The wretched one,” is certainly rather a wretched translation.

Defects of this sort are hardly felt by the native Englishman, who confines himself to the study of his mother tongue. It is only by comparison with other languages, that they are found out. Similar defects exist in all languages. And this is one reason, why the study of a foreign idiom must tend to

logical faculties.

NINTH ORDINARY MEETING.

ROYAL INSTITUTION, 23rd February, 1863.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

W. J. Callon, M.D., Mr. J. Simm Smith, and Mr. Charlton R. Hall, were balloted for and duly elected members.

Mr. MOORE exhibited, in an aquarium, a living specimen of the *Lump-sucker* (*Cyclopterus lumpus*), taken recently at Tranmere, and presented to the Museum by Mr. Scott, of Tranmere Foundry. This fish is rarely taken in the river, but is not uncommon round the rocky parts of the coast.

Dr. COLLINGWOOD read a communication from Mr. David Robertson, of Glasgow, relating to the immense amount of material collected by fishermen, which might be rendered available, as follows:—

GLASGOW.

DEAR SIR,

* . * * *

You will now better understand the nature of the want of which I was speaking to you, viz., *of a board of the leading naturalists appointed to name specimens.*

Laudable assistance has from time to time been rendered towards furnishing the means of accumulating knowledge in the various branches of natural history, but often with the prospect only of very small return. Now, does it not appear somewhat inconsistent that when the material is collected there should be no certain place for its recognition? Let us but have this, and we shall have the most essential encouragement to pursue our labour, and the most certain aid to secure prosperity, and to encourage and foster a love for natural history.

But in order that such a board might not be overtasked with minor communications, I would suggest that *county branches* be appointed, through which the correspondence of the surrounding districts would have to pass, so that only as much as was *new*, or could not be decided by them, should be sent to head-quarters.

Another important advantage would arise from this arrangement, and that is, that if everything passed under the supervision of our committee, much of the existing confusion and synonymy would be prevented, and the best opportunities offered for improved nomenclature, the stamp of genuineness being lastingly fixed upon what they had passed.

Now, suppose this point gained, let us revert to the material. As an adjunct to your comprehensive plan of enlisting the mercantile marine, we have a most prolific source of supply, which has been in a great measure overlooked, viz., the *fishermen*, whose daily employment places them in the midst of the best opportunities for collecting the most valuable material in natural history.

This single fact, that they are seldom prepared to secure safely what may turn up, is one great source of the loss of many rare and valuable things, and for this obvious reason, that the whole interest which they get in the matter is so worthless (I may almost say mean) that it is not worthy of troubling themselves about it, further than in being civil and obliging for the time when called upon.

Compare the chances these men have for bringing to light the treasures of the deep,—who are compelled for their daily bread to employ every available hour, and over diverse ground,—with *our* few days dredging a-year, and then only for a few hours a-day, and generally on well-known ground.

But the difference of time, vast though it be, includes only a small portion of the advantages possessed by their extensive and diversified appliances, fitted as they are for the different branches of industry which they pursue. And in many cases, so expensive are these, that few or no naturalists would think of supplying them; and still to them we are indebted for many of our discoveries in marine zoology.

The common *dredge* is in requisition the whole year in supplying bait for their lines, &c., and for eight months in the year for scraping the bottom of the deep in the oyster fisheries.

The value of the *trawl net*, which is extensively employed, is sufficiently known for its inexhaustible supply of material to the naturalist.

The *long line* is no less efficient in its own department, varying in lengths according to the purposes and means of those who employ it. Not unusually it stretches from four to six miles in length, with from three to four thousand hooks attached, and it is let down often on a bottom so rough and deep that no net could reach, nor dredge work upon it.

Fish alone, attracted by the alluring bait are not the only product, for many other valuable things are brought up which get entangled with the lines and hooks, such as corals, sponges, &c., which would rarely or never come under the reach of any other snare.

Again, we have numerous adaptations of the net to the various sizes of fishes. But just let us glance at the vast scope of the *herring nets* alone. Twenty barrels of net are said to be about the average quantity used by each boat. Each barrel contains forty fathoms, but when mounted on the lead-lines or ropes ready for use, they measure only thirty-five fathoms, which is fully three-quarters of a mile of net for each boat.

Now, when we reckon the fishing fleet of an average station, Greenock, for example, which registers about 2,000 fishing boats, and take the low average of half-a-mile of net for each boat, it gives us an amazing length of *a thousand miles of net partitioning out the sea of one district*.

It must be observed, that although the novelties taken by these appliances are not expected to pay any part of the expense, still they have the same advantage as if the whole were fixed for them; and although they are not sought for, nor appreciated, they are necessarily found securing their proportional place in the general take, as certainly as any fish in the net.

Now, this is the particular point that requires our special notice. The novelties are rarely appreciated or cared for by the fishermen, but are as a rule rejected and thrust back into the sea.

Yet all this inestimable treasure, taken at an enormous expense, could be secured to science, I may say, comparatively for nothing; for the trouble of carrying away, it might be conveyed to us, would we only be at the pains to make it properly known where it could be conveniently carried to and *appreciated*.

I am, yours truly,

DAVID ROBERTSON.

Dr. Collingwood.

The following paper was then read :—

THE ANCIENT FAUNA OF LANCASHIRE AND CHESHIRE.

By CUTHBERT COLLINGWOOD, M.A., F.L.S.

THERE is nothing so interesting to the cultivator of any department of Natural History as the ascertainment and collection of the natural productions which immediately surround him. Whether he restricts himself to some special department which claims his chief attention, or whether he indiscriminately masters all the Animal and Vegetable productions of his limited district, the occupation is, in both cases, one which every naturalist knows to be of the most fascinating description. Nor is it without important uses. The Fauna and Flora of any district should be best known by those who thus live upon the spot and devote considerable time and attention to it, and the Fauna and Flora of that country must be best understood, in which these ardent workers are most numerous. Hence there is no country so thoroughly explored as Great Britain and Ireland, although we must allow that there is still ample room for further observation and research ; and the young naturalist need by no means grieve himself with the idea that there is nothing left for him to do. The sentence written by Gilbert White in his twentieth letter to Pennant, "I find in Zoology, as it is in Botany, all Nature is so full, that that district produces the greatest variety which is the most examined"—may be regarded as an aphorism in Natural History, and is sufficient answer to such a groundless notion. But the value of accumulated observations carefully made and judiciously compared together, is well recognised by all the highest authorities of science ; and the results
 it themselves in an increased and comprehensive know-

ledge of the distribution of animals and vegetables,—in the relation of physical conditions to the well-being of organized creatures—the influence of disturbing causes—and all the various aids to biological investigation included by Huxley under the general term “physiology of conditions.”

A local Fauna, however, it must be conceded, embraces but a point of geographical space—an almost infinitesimal fraction of the earth’s surface,—not, however, that it is any the less valuable for this, for by the union of such fractional parts, considerable areas may in time be constructed and investigated. But there is another peculiarity of local faunas which is not so often considered, though perhaps of more importance,—and that is, that while they embrace but a fractional *space*, they refer also to a point in *time*, still more infinitesimal, (if I may be allowed such an expression), and bearing a much smaller proportion to the *duration* of organic life on earth, than the *area of the district* bears to the whole terrestrial globe. *Time present*, however important to us individually, is but a page in the volume of Nature—and while it must be allowed that it is the page at which the book lies open, and therefore one which “those who run may read,” nevertheless there are numerous other pages in the volume not inferior to it in interest. *Beyond* this, the book is sealed, but we may turn *back* the previous sibylline leaves, and on each we shall find traces, more or less confused, more or less legible, of what was once inscribed thereon, when *that* was the open page, and while as yet there was no man to read it. All is written in the same language, and the older inscriptions only differ from those which now lie before us, in having suffered from the destroying ravages of time.

• As supplementary chapters to the “Fauna of Liverpool,” prepared with such assiduity by my friend Mr. I. Byerley, it has occurred to me that sketches of the *Geological Fauna* of our District, and what may be termed its *Historic Fauna* would

be interesting, and in many respects not without their use—completing as they would the history of animal life in this locality from the very earliest to the present time. In the present paper I shall confine myself to the Palæontological part of the subject, reserving for a future opportunity, the notice of the more recent animals, which, though now no longer reckoned as dwellers within our limits, have yet been remarked among us within historic times.

In our home counties, the “imperfection of the geological record,” upon which so much stress has been laid by the ingenious Mr. Darwin, is remarkably apparent, and the long lapse of time which was demanded for the deposition and subsequent denudation of the geological horizon of our own district, is singularly devoid of any organic structures, which may afford a clue to the conditions of deposit, duration of period, or nature of animal life, which marked that epoch.

It would seem, indeed, that the seas which deposited these vast beds of red sandstone were never the source of that teeming life which we meet with in other geological formations, inasmuch, as the abundance of peroxide of iron which was diffused through them, and which gives the variegated colours to this rock, must have rendered those seas unsuitable for the performance of the vital functions of aquatic animals. It is chiefly to underlying strata, and to analogous deposits in other parts, that we are indebted for the elucidation of these questions; and although we may fairly take it for granted that certain groups of animals were characteristic of the era in question, I wish to confine myself on this occasion to such as have left imbedded in the rock undoubted traces of their previous existence.

For our purpose we may regard our two counties as devoid altogether of tertiary deposits, and of the hosts of interesting animals of high organization, which are found where these exist. *Post-tertiary* formations, in the form of littoral

deposits along the shores of Wirral and Lancashire, and peat mosses at various places inland, do however exist, and are not infertile sources of remains of great interest. So also, the upper portions of the Secondary system have quite disappeared, and neither the cretaceous nor the oolitic system find any representative, thus depriving us of the traces of the great land saurians, a host of fishes and other animals, which are found where these deposits prevail. Even in the Triassic system which is our own peculiar boast, the remarkable absence of the Muschelkalk, or shell limestone, leaves us only the pretty, but barren, Bunter and Keuper with their variegated marls,—and upon these Liverpool stands. But from a large portion of Lancashire the New Red has been washed away, and the more interesting carboniferous system has been laid bare, thus at once affording employment to the operative class, and objects of interest to the naturalist. In the indentations and interstices of the great Lancashire coal-field are visible limestone shales and millstone grit, the latter particularly being a highly fossiliferous deposit, however unpromising at first sight. Between Preston and Clitheroe, a further denudation has exposed the carboniferous limestone upon which the coal measures rest; and in the N.W. corner where it borders on Westmoreland, Lancashire shares a small portion of the upper and lower Silurian beds of that county.

In Cheshire there is less variety of surface, the new red sandstones of the North giving place to saliferous marls in the centre, from which there appears to be a total absence of organic remains. The Keuper occupies all the mass of the county, being flanked by Bunter formations in the east and west; and the extreme eastern side possesses a small coal field.

It is, then, the coal-series which is the great source of organic remains in Lancashire; the *middle* coal measures being the richest in fossils—the *lower* coal measures contain-

ing many of great interest, and the *upper* being but scantily developed. In addition to these, the millstone grit, "is by no means poor," except in the neighbourhood of Wigan, whence no fossils have yet been obtained. Plants are abundant as we might expect, but it is no part of my object to enter upon the fossil flora. Among the *coal roofs* as they are termed, "those of black shale contain bivalve shells, and detached scales and teeth of fishes; and with *Microconchus carbonarius*, and casts of Cyprides sometimes constitute nearly the entire mass. In the *blue binds* are beds of *Unio* and other shells; and almost all the black shale roofs of the lower field teem with remains of *Pecten*, *Goniatites*, *Posidonia*, and fishes. Shales with highly bituminous schists forming roofs, occur at Peel and Pendleton, and contain abundant remains of fish, mostly entire. (See Prof. Williamson, on fishes from Peel; Report British Association.) At Bradford and Ardwick, in the roof of the thin coal intercalated with limestone, the detached teeth, bones and scales of fish occur, mingled with countless myriads of *Cypris* and *Microconchus*." (Binney, Lancashire Coal Fields.) With regard to the distribution of fossils in the seams themselves, it is worthy of remark, that "cannel beds, generally found on the top of the coal, nearly always contain the remains of fishes, and often bivalve shells, but hitherto no traces of *Microconchus*; * * * but in the Lancashire coal-field no remains of fishes or shells have yet been found in the coal itself." *Ibid*.

It will be best to refer to the members of the geological fauna of Lancashire and Cheshire in an ascending series, commencing with those lowest in the organic scale, viz., the Protozoa. With the exception of the shelled Foraminifera, these animals and the Coelenterata are seldom preserved, on account of their perishable nature. In the neighbourhood of Manchester are some Permian beds, consisting of red marl, containing numerous thin bands of limestone (the thickest

being about eighteen inches) both fossiliferous. Here occurs a sponge of the genus *Tragos*, and some shells; and it should be mentioned, that Mr. Cunningham published a sketch (in No. 4 of our Proceedings) of what he believed to be "a cast of an impression of a Medusa, which retained in a very perfect manner the proofs of a similar conformation and constitution to these inhabiting our present seas." This object was obtained from the West side of Storeton Hill, and "the cast stands in relief about half an inch above the surrounding surface or bed of the slab, and must, therefore, have been impressed to a corresponding depth in the upper bed of the substratum." This, I believe, is the only instance of such an animal having been supposed to be found in this rock. But the lower forms of life (including Zoophyta) attain their greatest development in the distant corner of Lancashire, where the upper and lower Silurian beds come to the surface, in the neighbourhood of Coniston. Here are met with several species of *Favosites*, *Nebulipora*, &c.; several Crustacea, of the genera *Cheiurus*, *Illænus*, *Lichas*, *Phacops*, *Beyrichia*, and *Trinucleus*; as well as Bryozoa, of the family *Tubuliporidae* and *Escharidae*. But these are, as it were, accidental members of the Lancashire fossil fauna; and I shall only further refer to them by appending a list of the species.*

Annelids are not frequent, though what are supposed to be the tracks of them are found associated with reptilian footprints in the lower Keuper beds of the new red sandstone of Lancashire and Cheshire. Two species of Annelids are, however, characteristic of the coal measures, viz., *Arenicola*

* The following are the characteristic fossils of the lower Silurian beds about Coniston :—

Zoophyta.

Heliolites megastoma (Milleporidæ).

———— petalliformis.

Nebulipora explanata (Favositidæ).

Stenopora fibrosa do.

Sarcinula organum (Astrœidæ).

Petralia æquisulcata (Cyathophyllidæ).

———— bina.

Annelid.

Tentaculites annulatus (Tubicola).

many of great in-
veloped. In addition
ns poor," except
fossils have yet
ht expect, but
il flora. Among
black shale
h of fishes :
Cyprides so
blue binds
the black
Pecten, (1
nly bitum
dleton, (1
re. (S
ish Ass
the thin
h, bones
riads of
l Field
ns ther
erally 1
remain
es of
field :
e coa

Memoirs Manchester Lit
trorbis carbonarius. in the
 Wigan; the latter also,
 of the Holcombe brook
 the middle coal measures of
 coal measures at Pannicraft.
 series are not few, and
 their affinities. The most char-
 shire coal-field belong to the
Beyrichia Binneyana (Jones)
 Silurian, and is found in the lower
 near Wigan, and Rainford. A
 is also a common coal fossil,
 it is also found in the mill-
 Brook—in the lower coal measures of
 as well as in the middle coal measures
 species undetermined, is also found
 near Bolton; and indeed this little
 one of the most striking fossils
 the name of the Pendleton
Eurypterus, shortly to
 Geological Society, and which

[illegible]

rivals in size the great species figured by Dr. Hibbert. It has huge mamillated spines on the head and forward rings, and is here called *Eurypterus mammatus*."

But it is to the Mollusca that we must always look for the greatest number of remains of an ancient Fauna. The shells of Molluscos animals being of a compact and mineral substance, stand much more chance of preservation than the crustaceous integuments of crabs, or any other less hard parts of animals; and the completeness of their preservation is one cause of their value in determining the age of geological formations.

A *Lingula*, that persistent form which has left its stamp throughout the whole of the stony record, and still survives in our recent seas, occurs in the millstone grit at Rivington Pike and also in the lower coal measures north of Bolton. *Aviculo-pecten papyraceus* is a marine shell of the millstone grit and lower coal, (but scarce in the western part of the Lancashire coalfield), and *Microconchus carbonarius* of the upper coal series; as is also *Modiola Macadami* (Binney, Tr. Lit. and Ph. Manch., xii, 38). *Unionidæ* are generally diffused; in the upper series, bands three inches thick are entirely composed of individuals of a large size. In the St. Helens coal series, yards above the Rushey Park coal, there is a large tract of country an impure ironstone band is also generally prevalent some yards above the Delf or Arles mine (Prescot, 11). Many species have been restricted under a new genus, which several species are named, viz. :—*A. robustus*, in the lower; *A. ovalis*, *robusta*, and *aquifolia* in the middle series; and *A. centralis* in the upper middle measures of Bolton. The preservation is generally in one formation and sparsely

the other, is regarded by Mr. Salter as no argument against the general fact that the shells of the middle and upper coal measures differ as a whole from those of the lower; and the long lapse of time consumed in the deposit of coal is well illustrated by this change of the fauna in a very small geologic space. The *habitat* of *Anthrocosia* (or *Unio*) appears to be a matter admitting of some doubt, for although formerly considered as certainly a fresh-water shell, *A. acuta* is found at Clitheroe in a formation undoubtedly marine.

Other very characteristic shells are the genera *Anthracoptera* (including species formerly embraced under *Myalina* and *Avicula*) and *Anthracomya*—the former extending from the millstone grit to the middle coal measures, and the latter from the lower to the upper coal measures, where it is the only abundant shell; being found also in the Patricroft hæmatite, which supports the Permian rocks near Manchester. These Permian beds rest unconformably upon the upper coal measures, and the thin limestone bands in them are very fossiliferous, containing the characteristic *Axinus* (*Schizodus*) *obscurus* and species of *Bakewellia* and *Turbo*. “At Manchester the magnesian limestone disappears, almost mingling with the clays of the new red sandstone; but it contains, nevertheless, the *Axinus* and other fossils.” (Williamson.)

Besides these, the remains of Cephalopodous Molluscs are not wanting, and the highest type of Invertebrata is represented by species of *Orthoceras* and *Goniatites*. They are both found in the black shale roofs of the lower coal, near Bolton, and as many as six species of *Goniatites* occur in the millstone grit, and two in the lower coal measures, but none in the middle or upper. Here, again, the change of the invertebrate Fauna, which appears to have taken place between the lower and middle coal measures, is well illustrated. “Several of the genera,” says Mr. Hull (Bolton, p. 7), “and some of the species found in the lower coal measures of this and

other counties of England and Wales, pass upwards from the millstone grit, the Yoredale rocks, and even the mountain limestone. On the other hand, till very recently, the mollusca of the middle coal-measures were confined to two or three genera of bivalves (*Anthracosia*, *Anthracomya*, &c.) The researches of my colleague, Mr. A. H. Green, and myself, in the neighbourhood [of Bolton], have added the genera *Orthoceras*, *Nautilus*, *Discites*, and *Aviculo-pecten*; one species of the last-named genus, *A. papyraceus*, ascends into the top of middle coal-measures of Ashton-under-Lyne. But even with this addition, a considerable number of species may be considered as terminating with the lower coal-measures themselves."

It thus appears that the Goniatites of the millstone grit and *lower* coal, are replaced in the *middle* coal-measures, by species of *Nautilus* and *Discites*.

It may be interesting to mention in this place that my friend Mr. I. Byerley, of Seacombe, has met with remains on the shores of the Mersey, which appear to resemble the deposits known as *kitchen middens*. He informs me "that strata of shells exist at Wallasey, and in the sandhills along the shore, between Leasowe and Hoylake, which seem to resemble, on a small scale, the collections noticed by Mr. Lubbock, under the name of "shell mounds," in Scotland, and of "Kjökenmöddings," in Denmark. On going down the hill, just before entering Wallasey village, there is a bank, which may be twenty feet or more high, on the right hand side; two-thirds of its height is composed of sandstone, above which is a covering of earth from four to six feet in thickness; between the latter and the sandstone, a stratum of mussel-shells, about eight inches thick, may be seen. The shells are partly whole and partly broken; all, of course, are free from epidermis, but the striated colouring is as distinct as with recent specimens of the species. Having, however, lost much

of their animal element, they are more friable; and on being placed in water for the purpose of cleansing them, the outer layer of shell structure readily separates from the nacreous interior. This stratum appears to have no other species of sea-shell intermingled: the terminal whorl and apex of a univalve, however, was just perceptible, which, on careful removal from the matrix, proved to be *Helix aspersa*. This bed is about a mile from the present sea-shore."

The same gentleman has also observed either one or two strata of shells in the sandhills, on the shore between Leasowe and Hoylake. Not having visited the spot for some years, however, he can only report from memory that they are composed exclusively of cockle-shells. It is worthy of remark that these beds are situated very close to the place where the Anglo-Saxon antiquities were found at the Great Meols.

May we not infer that these shell strata are composed of the castaway refuse of mollusks which had been consumed as food by our prehistoric neighbours? *

The remains of vertebrated animals which have been hitherto discovered in our home counties are by no means numerous; but meagre as is the list, it is full of interest, more especially as on the one hand it connects us with the most ancient past, and on the other brings us down to historic times. Fishes are always amongst the most interesting of fossil remains, on account of the completeness of their preservation in many cases. The enamel of the scales which cover their whole bodies, protects the soft parts so effectually, that it often happens that the form of the body is preserved in an unchanged condition, and offers facilities for description and comparison with those of our own day equalled by no other

* Several remains of Mollusca characterize the glacial deposits on the banks of the Mersey, such as *Tellina solidula*, *Nucula oblonga*, *Cardium*, *Nassa*, and particularly *Turritella communis*, which passes upward from the sandy gravel of the lower drift deposit into the boulder clay above. From a well sunk at Poolton, in Wirral, fragments of *Mactra*, *Venus*, *Astarte* (?), and other shells were also

class of animals. The coal measures have afforded some remarkable fishes belonging to the great Placoid and Ganoid divisions. Of these, *Ctenoptychius denticulatus*, (a cestraciant which commences to appear in the Devonian rocks, and is found in the coal measures near Manchester, and in the cannel at Wigan), represents the Placoid fishes, whose remains commence to make their appearance in the Lower Palæozoic strata. Another Placoid, *Diplodes gibbosus*, one of the Hybodonts, which appear a degree later upon the stage (viz., in the middle Palæozoic), is met with in our carboniferous shale. Other Placoids are *Gyracanthus* (carboniferous) from the fish beds, or black beds of cannel, ironstone, or shale of Pendleton; *Ctenodus*, from the same situation; *Diplodus* (Pleuracanthus—carboniferous), from Bispham, near Wigan; and *Helodus*, a carboniferous cestraciant from the millstone grit of Wilder's Moor, Horwich, near Bolton. Among Ganoids is the *Holoptychius* (which commences in the Devonian strata), remains of which were found by Mr. Binney in the black bands at Pendleton, near Bolton; scales are also found above the gannister coal at Bradshaw; and the late Mr. Peace obtained good specimens of this fish from the cannel at Wigan. It is also met with in Laffog Colliery, near Copull. Other Ganoids are *Platysomus* (a carboniferous lepidoid species), also found at Pendleton; *Cœlacanthus lepturus* (also carboniferous), obtained at the same place; at Bradshaw, near Wigan (lower coal measures), scales only; and from the lower coal of Bispham, near Wigan; and *Diplopterus* (a Devonian sauroid) from Pendleton, and beautiful specimens from the cannel at Wigan. The genus *Rhizodus* is found at Bispham, in the gannister; a species is met with at Freeman's Colliery, near Copull, between the yard and bone seams; and a new species has lately been discovered—designated by Mr. Salter as having scales eroded or ridged in concentric lines—in the Whittle Green Colliery, near

Copull, above King Coal. *Rhizodus granulatus* is also found in the *three-yard seam*, Bolton, and the vitriol works, two miles from that town; and scales in the Holcombe series of the millstone grit. A new species has also been found in the upper coal at Patricroft, near Manchester.

But perhaps the most interesting of the ancient finny races which once swam over submerged Lancashire, is the Ganoid *Megalichthys Hibbertii*, which has been found in the coal measures near Wigan (cannel), Manchester, and in the gannister, or lower coal series, of Bispham, near Wigan. This genus also first makes its appearance in the Devonian series, though it is more characteristic of the coal formation. The *Megalichthys* belongs to the Sauroid division of Ganoids, "combining with many of the characters of a true fish, many close and striking analogies with reptiles; the teeth more especially so closely resemble those of some Crocodilean animals, that when first discovered, they were immediately referred to that class." These teeth are of great size, and conical, having also a conical hollow at the base in which a new tooth is prepared, so that there may be a constant succession, as in reptiles. A single tooth has been found measuring nearly four inches in length, by a breadth of nearly two inches at the base. These formidable teeth, intermingled with smaller ones, are scattered all over the inside of the mouth. The scales also of this remarkable fish closely resemble those of crocodiles, being angular and shining, and interspersed with large rounded scutella measuring five inches in diameter.

Another Ganoid fish which does not extend lower than the coal-measures is found in those of Lancashire, viz., the Lepidoid, *Palæoniscus Egertoni*, found at Ardwick, near Manchester, and scales of which are also met with at Patricroft. Our *Palæoniscus* is an exceptional fish to the generalization of Agassiz, who founded upon a great number of coincidences the rule that "the scales of *Palæonisci* of the coal are almost

universally smooth, while those of the magnesian limestone are almost universally striated or sculptured."

No Ctenoid or Cycloid fishes are found lower than the chalk.

If, however, it be the fact that the Triassic seas were inimical to aquatic life, it still remains to be proved why no vestiges of terrestrial animals should be found imbedded in the compact sandstone. Probably, the slow deposition and shifting character of those ancient sands may account for their total absence. It is, therefore, the more wonderful that, under the most disadvantageous circumstances, while material forms and solid bones have entirely vanished, transitory phenomena should have left traces as distinct to the eye of the nineteenth century as they would have been had any one been present, ages since, at their production. Where great terrestrial reptiles, and probably other animals, have left nothing but a tooth here and there to tell the tale of their ponderous existence, the gentle ripple of that chalybeate sea upon the sandy shore, the pattering of rain-drops upon the beach, and the direction of the passing breeze, have all left their imprint, which has defied the changes and convulsions of incalculable ages, and remains to this day as distinct as though it had been engraven with a pen of iron upon a rock of adamant. It is to the presence of thin laminæ of clay interspersed between the lower keuper beds of sand—upon "this ancient shore washed by still and quiet waters," and to this day shewing the cracks where it dried under the noonday sun—that we owe this marvel; and it is to the same simple cause that we owe the yet more interesting and astounding fact of our being acquainted, as Dr. Buckland observed (Address to the Geological Society, 1840), "with the certainty of cumulative evidence" not only with the *existence* of a race of gigantic amphibious reptiles, but with a familiar knowledge of their movements and of their haunts, "the

directions of the wind, the depth and course of the water, and the quarter towards which the animals were passing, as indicated by the direction of the footsteps which form their tracks." Here is a marvellous combination of circumstances, unmatched in the record of the rocks. Not even the Mammoth of the Lena, clothed with his flesh and hairy skin, "in his habit as he lived," affords so vivid a picture of life and economy in the remote recesses of time when no human eye was created, as does this wondrous uplifting of the mysterious veil, in the ancient days of the new red sandstone. Surely the trias is redeemed by this one fact from the opprobrium which attached to it from its poverty of fossil remains.

The Cheirotherium, as the animal in question is usually called, appears to be identical with those designated at various times the Mastodonsaurus, Salamandroides, Phytosaurus, and Labyrinthodon. Although the *structure* of the foot is still wanting, the great resemblance of the footsteps to those of certain toads, as well as other circumstances, renders it almost certain that it was a gigantic *Batrachian*, and not a *Marsupial* as originally inferred by Kaup. The Cheirotherium has left but little *substantial* record of his existence anywhere, and in our own Triassic rocks, there have been found no bones or teeth whatever; and the record of the reptilian races, which undoubtedly existed at this period, is confined to *ichnites*, or fossil footsteps. From these it is deduced that probably several species of Cheirotherium crawled upon the new red sandstone beach of Cheshire. One of these, *Cheirotherium Hercules* (the Labyrinthodon giganteus of Owen, Geol. Trans., 2nd series, vol. 6, p. 537) has left its traces in the Trias at Tarporley, Cheshire. A second species, *C. Kaupii* (the Labyrinthopachygnathus, of Owen, Geol. Trans.) is afforded by the Trias at Lymm, near Altrincham, Cheshire. A species, *undetermined*, is also found at Lymm, and described in the Proceedings of the British Association, 1842, sect^e., p. 56). The footsteps

most familiar to all of us are those of the Storeton Quarry, an account of which will be found in the Geological Society's Proceedings, vol. 3, p. 12—14. These are found on the under surface of the Sandstone, in what is called the footprint bed of the Kenper. They are moulded upon impressions originally received in the soft mud or clay upon which the animals walked. They were first discovered, in 1838, by John Cunningham, Esq., F.G.S., of Liverpool.

“The footsteps found in the quarry at Lymm, in Cheshire, vary from $\frac{7}{8}$ th of an inch to $1\frac{1}{4}$ inch in length, and sometimes reach the length of four inches ; and upon a slab of dark red sandstone is an impression 10 inches long, but of a peculiar form, as though the foot that made it had been furnished with claws. These beautiful impressions appear to have been left upon a thin stratum of the finest clay, which was so well prepared to receive the mould as to leave a cast so delicate as to give the texture of the skin that covered the sole of the foot. This appears to have been covered with small papillæ, about 100 to the square inch in the larger specimen, and 220 to the square inch in the smaller specimens ; shewing that the sole of the foot was furnished with a rough skin, such as might have been expected from an animal that walked upon a sandy shore.” There is also reason for believing that this Batrachian was not smooth externally, but was protected, on certain parts at least, by bony scutella.

Besides these, and associated with them, other reptilian footsteps are extremely frequent. Such impressions occur at the Storeton Quarry, at Lymm, at Weston Point, near Runcorn,—nearer Liverpool, in Flaybrick Hill, and in Liverpool itself, in an old quarry, long worked, and situated in Rathbone street. The difficulty of determining the nature of such footsteps, in the absence of any more material clue in the form of bones is, of course great, and any guess is, therefore, liable to error. Morris, in his catalogue of fossils, refers to them as

species incertæ reptilium. They have, however, some of them received names, and those of Storeton are called *Rhynchosaurus*. Some slabs from that quarry were examined by Dr. Buckland, who concluded that the tracks of four or five smaller animals were present, apparently small aquatic and land tortoises (Geol. Proc., iii, 59). In No. IV. of our Proceedings are some most interesting figures of footprints from Storeton quarry, which are all of a very singular form, found by Mr. Cunningham on the West side of the hill. They appear to be of two or three different kinds of animals, and scarcely a guess can be made as to their nature, though I should suppose fig. 4 to be crocodilean origin. Small tortoise-like impressions occur also at Weston Point, where they are found in company with the steps of *Rhynchosaurus*; but Professor Harkness observes, that at Storeton, and also at Lymm, the footsteps of this animal occupy a high position in the Bunter sandstone.—British Assoc. Rep., 1850, p. 84.

With regard to Birds, although some footsteps of a very problematical character have been referred by observers to this class, the existence of ornithichnites in the Trias of Cheshire is not, I believe, recognised by the best authorities. Not, however, that there is no precedent for the traces of birds in this geological horizon, for the new red sandstone of the valley of Connecticut is remarkable for the number of such traces; but it is worthy of notice that these usually most nearly resemble the footprints of *Grallæ* or wading birds. Figure 8, in No. IV of our Proceedings, purports to be the “cast of an impression of a web-footed animal with three toes, probably a bird.” But the Connecticut *bird*-prints appear in no cases to be those of web-footed species. Professor Harkness also exhibited to the British Association, in 1850, a drawing of the steps of a biped from Weston Point, near Runcorn, referring to it as the first which had been noticed in this country, but both this and Mr. Cunningham’s figure are classed by Morris as *Reptiles of uncertain species*.

It is, however, to the most superficial deposits that we must look for any indication of remains of the Mammalian fauna of ancient times, and here, indeed, we meet with traces of the greatest interest. We have no bone beds or bone caves abounding in a variety of pre-historic remnants of wild animals, nor have we any pleiocæne or other tertiary deposits wherein to search for them, but we have evidences of changes which have taken place along our coasts in times bordering upon the historic era; and entangled among the submerged trees of ancient groves, we meet with the denizens of forests probably coeval with our early and uncivilised ancestors. In the peat bogs and mosses, also, which characterize the county palatine, an occasional discovery is made which betrays the previous existence of animals long since regarded as foreign to these regions. Such was the hippopotamus, of which a complete skull is figured in Leigh's Natural History of Lancashire (1705), and described as "an exact cutt of that hippopotamus or sea-horse head, dug up under a moss in Lancashire, which I frequently saw." (Tab. 6, figure 4.) There is no doubt about this figure, and Dr. Leigh, as well as Dr. Buckland more than a century after him, considered the discovery as conclusive evidence of the universality of the Noachian deluge. Of this skull, Owen remarks (British Fossil Mammals and Birds, p. 401), "It was probably from freshwater marl that the entire skull of the hippopotamus was obtained, which is stated by Leigh, in his History of Lancashire, to have been found in that county under a peat bog, and from which work Dr. Buckland has copied the figure given in plate 22, figure 5, of his *Reliquiæ Diluvianæ*. From the indication of the second premolar in this figure, we may, I think, discover the greater separation of the tooth from the third premolar, which forms one of the marks of distinction between the fossil and recent hippopotamus." This is perhaps the oldest of our Mammalian remains; and in other parts of

England, as in the valley of the Thames, the hippopotamus was associated with the mammoth ; while in Yorkshire, Dr. Buckland observes that there was a long succession of years in which the elephant, rhinoceros, and hippopotamus, had been the prey of the hyænas, which, like themselves, inhabited England in the period immediately preceding the formation of the diluvial gravel.

The animal, perhaps, next in point of interest, as in size, is the great Irish Elk (*Megaceros hibernicus*). Although, however, of larger dimensions than the great American Moose, the size of the Irish Elk was not proportioned to the vast spread of its majestic antlers ; nevertheless, it stood fully six feet high to the top of the shoulders. The question of its contemporaneity with ancient man has lately been mooted ; but there does not appear to be sufficient evidence to raise it from the society of the mammoths and rhinoceri just referred to. I am not at present able to give the particulars of the discovery of this magnificent animal in our county, but I will only say that the antlers have been found in the pleistocene fresh-water deposits, or, in other words, in the marl or gravel beneath peat bogs.

At the time that Professor Owen wrote his book upon British Fossil Mammals and Birds, Lancashire and Cheshire yielded but little material for such a list, beyond what I have already mentioned. Since that time, however, the existence of other interesting members of the ancient Fauna have been discovered in several localities. The great submarine forest at Leasowe, as might have been anticipated, has yielded evidence that it was once inhabited, and horns and skulls have from time to time been discovered in the peat and clay. But evidence is not wanting to shew that the submergence of this tract has taken place with great rapidity, and that the date of the forest's growth may not be far back in the historical era. The present lighthouse, when built in 1764, was

half a mile from the sea, and would long ere this have shared the fate of the previous one, which the sea gradually engulfed, had it not been that the absolute necessity of resisting the insidious encroachments of the sea had been recognised, and the embankment constructed in time. The old pool, or site upon which the town of Liverpool was built, and Wallasey Pool, upon the Cheshire side of the river, have probably been longer covered, and the deposits extend to a greater depth, forty feet below high water mark beneath the custom-house, and upwards of thirty-five feet in Wallasey Pool. When the custom-house was built in 1829, stags' horns, and fragments of bones (of the character of which I am not aware) were found associated with stumps of trees in situ at a depth of twenty-seven feet below high-water mark. But the most remarkable discoveries were made during the excavation of Wallasey Pool for the construction of the Birkenhead great float. Here were brought to light several horns, skulls, and bones, from depths varying from thirty-two to twenty-five feet below the level of the surrounding land, and several feet beneath the original bed of the pool, associated with numerous stumps and roots of trees in situ at various levels. These remains are of the greatest interest, and have been well described, and some of them figured, by Mr. Moore, in a paper read before the Historic Society, in 1858.

The first relics which claim our notice from these sources are the skull and horns of the Great fossil Ox (*Bos primigenius*), a species regarded as distinct from the common ox of our day, and at least one-third larger than the largest modern breed, with much more massive horns. Owen gives reason to believe that this Great fossil Ox, though quite extinct at this time, has lived within historic times, and identifies in *Bos primigenius* the great Hercynian urus, which Cæsar describes as so much surpassing domestic cattle

in size.* A formidable animal must this have been, and it seems far more reasonable to suppose, independently of other grounds, that our own satisfactory domestic cattle were always distinct from, rather than degenerated descendants of, the great fossil *Bos primigenius*.

In the excavations at Wallasey pool, Mr. Moore relates that several horns and portions of skulls of this species were disclosed, two of the horns being found at the foot of one of the trees at the higher end of the pool. The length of one nearly perfect skull was 2 feet 4 inches, and the span between the tips of the horn cores 2 feet 5 inches. Sir Edward Cust possesses an unbroken skull of *Bos primigenius* obtained from the submarine forest at Leasowe, where it was found imbedded in peat and clay; and Mr. Morton has the horn of a female, or young individual of the same species, found at Bootle.

The other species of ox found in Wallasey pool was *Bos longifrons*, a much smaller species, first obtained by Hunter from an Irish bog. This animal, remarkable for the elongated form of the skull, is suggested as the wild race of indigenous cattle which our aboriginal ancestors reduced to domesticity. Its horns were short, measuring only 6 or 7 inches in length, and 12 inches in span, a character which our short-horned Highland and Welsh cattle still possess. A very fine and perfect skull of this species was among the treasures of Wallasey pool, and now in our Museum, and others have been found at Leasowe and Hoylake.

The rib of a large cetacean animal was also found in the excavations at Wallasey pool; and the humerus of a Whale has been dug out of the peat composing the submarine forest opposite Leasowe Castle.

* "Tertium est genus eorum qui Uri appellantur. Hi sunt magnitudine paulo infra elephantos, specie, et colore, et figurâ tauri. Magna vis eorum et magna velocitas; neque homini, quam conspexerint, pareunt. Amplitudo cornuum, et figura, et species multum a nostrorum bouum cornibus differt."—Cæsar, de Bello Gall., Lib. vi, c. 20.

If, in the two species of *Bos* just referred to, we can trace glimpses of our ancient Fauna as it existed in the time of the Roman invasion of Britain, the next animal to be noticed brings us down directly to our own day, for the *red deer* (*Cervus elaphus*) although found associated with the before-mentioned extinct animals, is still living in the northern and southern confines of Great Britain, though no longer a denizen of our own neighbourhood. Not longer ago, however, than Leland's time, red deer were plentiful in "the fayre and large forest of Dalamare," (It. iii. 42), as well as the forests at Low Furnis; and the proof of the long existence of these animals is found in the fact that their remains are those most frequently met with in the recent shell-marls of Scotland, associated with those of the ox, boar, horse, dog, hare, fox, wolf and cat, in the order of their relative frequency, according to Sir Charles Lyell. Pennant remarks upon the "horns sometimes met with in our own kingdom." "These," he says, "are evidently of the stag kind, but much stronger, thicker, heavier, and furnished with fewer antlers than those of the present race; of these some have been found on the sea coast of Lancashire, (Ph. Tr. 422); and a single horn was dug a few years ago out of the sands, near Chester." (Br. Zool. vi, p. 62.) Four imperfect horns of the red deer were taken near the same spot as the great fossil ox, in Wallasey pool, but finer specimens have occurred in other parts of Lancashire. "Hopkins transmitted the sketch of an antler of a large red deer to the Royal Society, which is figured in vol. 37, No. 422, of the Phil. Trans. The terminal branches of the crown are broken off, yet the length of the antler is 30 inches, the circumference of the base 10 inches, and the length of the brow antler $16\frac{3}{4}$ inches. This was drawn out of Ravensbarrow Hole, adjoining Holker Old Park, Lancashire, by the nets of a fisherman in 1727. The tide flows constantly where it was found, and the land is very

high near it." (Owen, p. 473.) Similar horns have been found in the submerged forest at Leasowe.

In Leigh's Natural History of Lancashire there is an account of a fine pair of horns of the red deer, accompanied with a carefully described plate. (Tab. 5.) "This figure is the head of a *stag of Canada*,* found 8 yards within the marle in Lancashire, with the vertebræ of the neck adhering to the head; one as large again as this was found 4 yards under the moss in the Meales (Meols) in the same county." The figure in question represents the horns as about 41 inches in length, with a span of 35 inches "between the two middles." Of this specimen Owen remarks—"The antlers attached to the head of the stag found beneath a peat moss, and figured by Leigh, attest an animal of equal size" to that figured in the Phil. Trans. Camden also mentions the frequent occurrence of horns of the legh, or scofe, or large stags' horns as "frequently found underground here." (Britannia 3, 142.)

In the account of the visit of the Literary and Philosophical Society to the submarine forest at Leasowe in 1845, it is stated that "Dr. Watson * * reported that bones picked up by him in the same district * * a tibia and a vertebra, had been identified by Dr. Scouler as belonging to the elk or moose deer, though of a small individual of the species." According to Mr. Geo. Thompson, the head and antlers of the same animal were picked up here also by some members of the British Association in 1837. They are deposited in the Museum of King's College, London." (Pro. Liv. Lit. and Ph. Soc., No. 1, p. 106.) †

* *Cervus Canadensis*, The Wapiti, (an error), the form of the horns being very similar to that of the red deer.

† Dr. Pollok, the Curator at King's College, informs me that these relics do not exist in that collection. He says—"From my personal knowledge, as well as from all I can learn, the fossil bones and skull that you refer to are not in our Museum. We have just moved from the old Museum into a larger and more commodious one, and I do not think such specimens could have been overlooked in the removal, if we had possessed them." (May 4, 1868).

But, perhaps, the most interesting collection of mammalian remains made from the ancient forest-bed at Leasowe, was that accumulated with the greatest diligence by Mr. E. T. Higgins, formerly of Birkenhead, and now of Eastington, Gloucestershire. This gentleman constructed an almost entire skeleton of a horse of small size, equalling the Shetland pony in height, and remarkable for the large proportion of the head. In addition to this interesting relic, he had discovered bones of the ox, pig, red deer, roebuck (?), and of a dog, about the size of a greyhound. All these were from the peat; and the sandy bed below he obtained the pectoral defence bone of a species of *Silurus*. It is very much to be regretted that this most interesting series of remains should have been lost to our Museum; but we are sorry to learn that the discoverer of them has parted with them, and that they have been scattered among his friends.

The only other quadruped to be mentioned is the wild boar, of which the only account I have is a notice in Camden's *Britannia* of the discovery of boar's tusks in digging a cellar at Lancaster. Two things must be remarked in connection with this circumstance, viz., first, that the tusks in question were found in company with Roman remains, and might, therefore, very probably have been deposited there by human agency; and secondly, that we ought to expect, on the other hand, to find remains of wild boars, inasmuch as we have positive testimony of their existence in this country in comparatively recent times. Thus, Camden says that "at Low Furnis, the forests abound with deer and wild boars."

This paper would scarcely be complete without the mention of the discovery of a human skull in sandy gravel, about ten feet below the original bed of Wallasey Pool, and in close connection with the ancient fossil oxen before referred to. Here then is the probable contemporary of the great, swift, and strong

Urus, and the short-horned ancestral ox;* here is the eye-witness of the primeval monsters of the British forests, bearing silent testimony to the contemporaneity of man with those vast creatures which his multiplication and increasing dominion have long since exterminated. What scenes of primitive nature in our now densely populated island have the eyes which once filled these sockets beheld ! and could it yet speak, what light would this reasoning, though probably savage, human being cast over the secrets which are so eagerly grasped at by the prying curiosity of the geologist and the antiquary. But the tongue and its unknown language are alike lost, and the vaulted temple of thought, buried for centuries, tells not the secrets of its prison house. But though it lies before us and makes no sign, it is yet full of significance, revealing to us one of those countless links in the chain of human improvement and civilization, upon the vantage of which we *now* stand, and are thus enabled to gaze with an intelligent eye upon the great panorama of the past.

* This skull exhibits a low type, in which the forehead is narrow and low, the frontal ridge prominent, and the occipital portion largely developed. It has been examined by the authors of *Crania Britannica*, who pronounce it to be that of a female advanced in age. The period to which the individual belonged is not determined, but it is probably not so ancient as the stone age. The skull was incrustated with Barnacles and other marine remains, when discovered.

TENTH ORDINARY MEETING.

ROYAL INSTITUTION, March 9th, 1863.

WILLIAM IHNE, PH.D., President, in the Chair.

The Council having invited ladies to this meeting, there was a large attendance.

The PRESIDENT on taking the chair referred to the approaching marriage of the Prince of Wales, to be celebrated the next day, and expressed the loyal wishes of the Society upon the occasion.

Mr. E. J. Reed, chief constructor of her Majesty's navy was elected an Honorary member.

The Rev. Joshua Jones, M.A., and Mr. D. Buxton, M.R.S.L., were balloted for and elected ordinary members.

Mr. HIGGINSON announced that the formal opening of the Gallery of Inventions and Science was fixed for the following morning at ten o'clock.

A paper was then read of which the following is an abstract :

THE HISTORY OF ENGRAVING.

BY THE REV. C. D. GINSBURG, LL.D.

THE art of *chalcography*, or taking impresssions from *copper-plate engravings*, is supposed to have been invented in Germany about 1450, and thus to be coeval with the art of printing with moveable types. Some writers of high authority, however, affirm that we are indebted for the origin of this art to the ingenious Florentine sculptor, Maso Finiguerra, who discovered it accidentally.

Pure line engraving is the oldest mode of copper-plate engraving. It is nothing more than drawing elegantly on metal. The design is traced upon the plate, which must be perfectly smooth and polished with a sharp tool called *a dry point* or *etching needle*, and the strokes are cut or ploughed upon the copper with an instrument of an angular form distinguished by the name of *graver* or *burin*. In the first state of the art the lines are comparatively rude, and the value of those productions chiefly consists in the correctness of the drawing. As early specimens of line engraving, when compared with later ones, show the gradual progress of the art, and as the impressions are very rare, they are eagerly sought after and highly prized by collectors.

Like some of us, engraving wisely improved its state by a happy marriage, with the issue of Albert Dürer. This immortal artist invented about 1517 that species of engraving known by the name of *etching*, the process of which is as follows:—The plate is heated upon a stove with a charcoal fire, so that it may not be smoked ; a piece of etching ground, which is a composition of virgin wax, asphaltum, Burgundy pitch, &c., incorporated by melting over a fire, and capable of resisting the action of aquafortis, is rolled into the form of a

ball, tied up in a little silk bag, and rubbed over the surface of the plate. The heat of the plate causes the ground to melt and come through the silk on the copper ; then a small dabber made of cotton wool, tied up in a piece of taffety, is quickly dabbed all over the face of the plate while yet warm, in order to make the wax or etching ground which covers it of uniform thickness ; the ground is then held over the smoke of a wax candle to blacken it, and the plate is left to cool ; it is then ready to receive the design. This is traced with a black lead pencil on a piece of thin paper, and laid with its face downwards on the etching ground covering the copper-plate, and then passed through a rolling press, which causes an impression of the outline to be transferred on the smoked ground. The design thus transferred on the etching ground is cut through with etching needles, and the strokes thereby produced are bitten or corroded into the copper with aquafortis. It was the happy union of line engraving with this discovery of Albert Dürer's, which, through skilful treatment, produced the masterly prints of Gerard Audran and others.

Next in point of age is the invention of engraving in *dots*, which was practised about the year 1510. The dots are effected in several ways, and are used either for the whole or certain parts of the engraving. Dots without strokes are executed with the dry point or etching needle, upon etching ground, bitten in with aquafortis, and are afterwards harmonised with the graver, by means of which instrument small dots are made. Sometimes the graver alone is used to express the flesh and the finer parts of the picture. In the print of Domenico Campagnola, about 1570, representing *St. John the Baptist holding a cup, and looking upwards*, the background is expressed by round dots, which appear to have been made with the dry point or etching needle. The outline of the figure is put in with a deeply-graved stroke, finished within with dots, and the hair and the beard are expressed by strokes ; whilst Agostino da Musis,

or Veneziano, pupil of Marco Antonio, expressed the flesh only in dots in several of his pictures. Though the art of copper-plate engraving could now count its great masters by scores in Germany, Holland, France, and Italy, it made its way very slowly to England. As late as the year 1590, there was hardly such a thing to be found as an English copper-plate engraving. Sir John Harrington, in his translation of Ariosto, published in the year 1591, informs us that he "never but once saw pictures cut in brass for any book except his own, and that book was Mr. Broughton's treatise on the Revelations."

Another important style of engraving is that which is distinguished by the appellation *mezzotinto*, invented about the year 1642. It is executed by raising a uniformly dark bar or ground on the plate by means of a toothed tool. The design is then, traced upon the plate, and the bright parts are scraped off with instruments in proportion as the effect may require it. The invention of this style of engraving has commonly been ascribed to Prince Rupert. But whatever may be the doubts about his having originated this style of engraving, there can be no doubt that the honour of having first introduced it into England belongs to the Prince.

The last species of engraving we have to mention is *aquatinta*, which derives its name from its resemblance to water-colour drawing. As in etching, the design is first traced upon etching ground, and afterwards a sort of wash specially prepared for the purpose is laid on by means of aquafortis. By this mode of engraving, which was originally invented by Le Prince, a French artist, about a century ago, drawings in Indian ink, bistre, and other washes are successfully imitated. Such are the different styles of engraving which, as we shall hereafter see, are beautifully adapted by the skilful artist to different subjects. We shall now glance at the development of this art in the different countries in which it was practised.

Though the art of engraving, in the common acceptation of the term, is comparatively modern, not being older than the invention of printing in Europe, yet its progress must not be judged by its age. It grew into a giant almost in its infancy, as may be seen from the productions of the early masters in Italy, Germany, Holland, and France. To enable you to see this, as well as to help you to enter into the peculiarities of style, and the distinguishing features of each school, we shall review some of the works of the most eminent masters, according to their countries, and in chronological order. As Germany is supposed to be the country where prints first made their appearance, we shall begin with it.

Of the earliest masters of Germany, viz., Michael Wolgemut, and Wm. Pleydenwurff, who published, in 1493, the celebrated *Nuremberg Chronicle*, with woodcuts, and of Martin Schoen and Von Mecheln, who engraved on copper, it may be said that their works are more rare and curious than beautiful. Not studying from nature, and not having the advantage possessed by the Italians of being able to refer to the remains of Greek art, the early German artists are defective in drawing; their naked figures are incorrect in the outlines, meagre and emaciated, and look as if a few hearty meals of English roast beef and plum pudding would have done them good.

These were followed by the immortal Albert Dürer, the inventor of etching (1471—1528), who created a new epoch in Germany, both in woodcuts and in line engraving. Few persons are altogether unacquainted with his productions.

So highly were his talents appreciated, that the Emperor Maximilian, who often visited his studio, after gazing with admiration and delight at the print of *The Conversion of St. Eustachius*, ordered that the copper plate should be filled with

gold, anxious, ere its beauties should become faded, to enshrine for ever this wonderful work.

Next in rank are Lucas Cranach (1470-1533), the friend of Luther and Melancthon, who, through the influence which he exercised by his great skill in taking accurate portraits, and in delineating birds and beasts, had numerous imitators; the brothers Bartel (1496—1550), and Hans Sebald Beham (1500—1555), who studied at Rome under Marc Antonio Raimondi, whose prints are deservedly held in very high estimation and greatly sought after by collectors, and who, together with the renowned Henry Aldegrever (1502—1565), are denominated the *little masters*, on account of their prints being generally small; and lastly, the brothers David or Daniel (born 1510), and Jerome Hopper (born 1535). These constitute the principal masters of the early German schools of engravers, to whom we may add Melchior Lorch, or Lorch (1527—1586), who engraved both on wood and copper, in a bold, free, and neat style; and the exquisite etcher, Jonas Umbach (1624—1700), whose works are very spirited.

Passing over the other masters, we come to the renowned James Frey, (1681-1752,) better known by his Italian name Giacomo Frey, who studied in Rome, and who was the founder of a new school in Germany. Few artists have approached nearer the style of the painters from whom they engraved than he. Whilst Frey introduced into the German school the gracefulness of the Italian artists, Justus Chevillet, (born 1729,) who studied under the celebrated George Wille, taught his followers the neatness of the French school. With equal success did James Philip Hackert (1737-1807) labour in the department of etching, as may be seen from many of his prints, which are executed with great fire and spirit. We must conclude this school with the two Müllers, father and son, of whom Germany may justly be proud. The father, (1747-1880,) who only engraved thirty-three plates, immortal-

ised his name by his engraving of the Madonna della Seggiola, which is considered by many a superior print to that of the same subject by Raphael Morghen. The son, Christian Friederich von Müller, (1783-1816,) who surpassed his father, engraved only sixteen plates, owing to the shortness of his career; for he fell a victim to the art he so fondly loved when he was only thirty-three years of age. He was engaged by Rittner, a printseller of Dresden, to engrave the Madonna di San Sisto of Raphael, in the Dresden Gallery, and entered with heart and soul upon the execution of the work, which he finished in a manner worthy of himself and the sublime painter. But when he brought the first proof to his employer, the mercenary man shook his head and told him that he must go over the whole plate again, and retouch it throughout, for that such delicate work would not throw off a sufficient number of impressions to answer the trade purpose. In vain did Müller remonstrate with the £. s. d. man, and he was compelled to rework the plate. At every touch he felt as if his life-blood were departing from him, and that he was sacrificing genius to gain; and by the time he completed his labour he was broken-hearted, and died on the very day on which the first proof was taken from the retouched plate. This proof impression which he did not live to see was suspended over the head of his bier as he lay dead, thus reminding the spectators of the similar untimely fate of the great master of the original.

We now come to *the Dutch and Flemish school*, which, though younger by nearly a century than the German, has surpassed it both in the number of artists and the handling of the graver. Lucas van Leyden (1494-1553) the friend of Albert Dürer may be regarded as the father of this school. The fertility of his genius, displayed in the diversity and drapery of his characters, the power and beauty of his composition may be seen in his prints of "*David playing before Saul*" and

"the Great Crucifixion." Passing by the oldest masters, who date from 1510 to 1550, such as Jerome Cock, Adriam Collaeret, Hans Bol, &c., of whose works we have many fair specimens, we notice Cornelius Cort, who went to Italy, resided at Venice in the house of Titian, and there engraved some of his finest works. He afterwards went to Rome, where he established a school, and executed many of the excellent works which are the delight of the judicious collector, and instructed Agostino Caracci in the masterly use of the graver. The galaxy of engravers which appears above the Dutch horizon from this time is almost innumerable.

The Italian school is almost contemporaneous with the German, or, as some will have it, is older than the German school, and in dignity of composition, in unaffected drapery, in simplicity and grace, is superior to all other schools, especially in its early age. This arises from the fact that the Italian artists had the remains of the masterpieces of ancient Greece. The superiority of the drawing of the human figure in this school is moreover to be ascribed to the fact that the Italians drew all their figures in skeleton, then clothed them with flesh, and, lastly, arrayed them in drapery. The oldest specimens of this school which I can show are the prints by Andrea Mantegna, who was born in 1431, and died in 1505.

But no engraver of antiquity deservedly occupies so distinguished a position as Marc Antonio Raimondi (born about 1487.) The correctness of his drawing, the gracefulness and beauty of his figures, and the simplicity and elegance of his execution are unparalleled. See his prints of *Adam and Eve*, the *Martyrdom of St. Felicita*, the *Judgment of Paris*, &c., and it will not be wondered that he should have been the founder of a new school and turned out such eminent disciples as Agostino Veneziano (1496-1540), Marco da Ravenna (born circa 1496), Jacob Caraglio (1512-1570), Julius Bonasoni (1510-1580), Nicolas Beatrice (born about 1500), Enea Vico

(1520-1570), the family of Ghizi, &c. The works of all these pupils are very beautiful and are highly esteemed by collectors.

Though *the French school* is generally considered to commence with John Duvet or Danet (born 1485) or the *Master of the Unicorn* as he is called, from his frequent introduction of that animal in his compositions, yet with the exception of the ingenious Stephen Laulne (1520-1595) we have hardly any master of distinction till we come to the admirable and quaint John Callot (1593-1635), whose prints are very spirited and display great vivacity. He was succeeded by Claude Mellan (1601-1688) who adopted the novel and singular method of working with single parallel lines, without any cross strokes over them, expressing the shadows by making the same lines stronger and near to each other; and by John Morin (1612-1666) who alighted upon that peculiar manner of mixing lines with dots which he so admirably harmonized with each other and employed so successfully in his highly prized portraits. But nothing can surpass or even equal the portraits of Robert Nanteuil (1630-1678). To this period, which may be regarded as the golden age of this art in France, belong Peter von Schuppen of Antwerp (1623-1702) the pupil of Nanteuil, the eminent Anthony Masson (1636-1700), and Gerard Edelinck (1627-1707). A little later appeared the two Drevets, father (1664-1739) and son (1697-1739). Specimens of the works of these artists, as well as of those of the inimitable John James Balechou (1715-1764) and John George Wille are indispensable to the formation of a collection. Without these it is impossible to form a correct notion of the development of the art of engraving in France.

The English school. During the time that the German, Dutch and Italian schools were making marvellous strides towards perfection, there was a solitary copper-plate engraver in England of the name of Thomas Geminus, who executed in 1545 the frontispiece to *Vesalius's Anatomy*. Remigius

Hozenberg (flo. 1550), the family of Passe, Wenceslaus Hollar (1607-1677) and other foreign artists were engaged in all the fine work in our country. The proper English school of engraving commences with the eminent William Faithorne (1620-1691). Between him and the celebrated William Hogarth (1697-1764) there is hardly any artist worth mentioning, and indeed we have no engraver of distinction till we come to the famous Robert Strange (1721-1792) and William Woollett (1735-1785), the one distinguished for subjects, and the other for landscapes. To these must be added John Smith (flo. 1720), Valentine Green (1739-1813) and Richard Earlom (died in 1822), who stand pre-eminent as mezzotinto engravers, as well as William Sharp (1749-1824) one of the three most celebrated English line engravers, the other two being Strange and Woollett. The merits of Sharpe may be judged of from the following anecdote. When at Rome he visited the famous Raphael Morghen who was then very old. The Italian engraver exhibited to the English artist various masterpieces, and in accordance with the old custom, reserved the best wine for the last. Before finishing, Morghen exclaimed—"And now, Mr. Sharp, I will show you a print which is equal to anything I ever did in my life," and then produced Sharp's own engraving of *The Doctors of the Church after Guido*. It needs hardly be said that Sharp felt highly flattered and delighted with this compliment, and when, after returning to England, he related this story, he added, with a vanity not altogether inexcusable, "And indeed the old man was not far from right."

ELEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, March 23rd, 1863.

WILLIAM IHNE, Ph.D., President, in the Chair.

The Council having invited the attendance of ladies, there was a large meeting.

The Rev. G. C. Page, Mr. R. D. Jones, (Collegiate Institution) and Mr. Archibald Roxburgh, were balloted for and elected ordinary members.

Mr. MOORE exhibited some marine animals of the genera *Salpa*, *Porpita*, &c., collected in a voyage from China by Captain Baker, of the ship "Nippon," who was proposed as an Associate of the Society.

Mr. MOORE also exhibited under the microscope some newly-hatched ova of the great lake trout, from Switzerland.

Dr. COLLINGWOOD called attention to the fineness of the equinoxial week, with reference to a pamphlet published in April last, by Mr. Du Boulay, in which the writer called upon his readers to verify his data for predicting a wet summer for last year. The truth of this prediction was verified, and the same principles should indicate a very fine summer during the present year.

A communication with reference to the paper of the President on English Grammar, was then made, as follows:—

OTHER, EITHER, OR, WHETHER.

By J. A. PICTON, F.S.A.

THESE words, whether used as pronouns or conjunctions, have a very close connexion with each other, and from the loose and confused manner in which they are employed and substituted for each other in the early stages of our language, their examination and analysis is attended with some difficulty.

For a philological inquirer into the etymology of the Aryan tongues, there is no rest for the sole of his foot, until he has hunted down a word, through all its Protean forms, back to its Sanskrit radical.

Adopting this course, we find the original prototype of “*other*” in the Sanskrit *antara*, bearing the same signification. It is a compound term formed by the pronominal root *an*, which indicates individuality, and is identical with the Greek *ἐν* and the Latin *un-us*, also with the German *ein*, English “*an*,” or “*one*.” The other syllable “*tar*” or “*tara*,” signifies to step beyond, to place beyond, and is the original root of the second degree of comparison in most of the European languages. *Antara*, therefore, signifies the thing separated. With this correspond the

| | |
|----------------------|--------|
| <i>Gothic</i> | Anthar |
| <i>Old German</i> | Andar |
| <i>Modern German</i> | Andere |
| <i>Swedish</i> | Andre |
| | Annan |
| <i>Old Norse</i> | Annar |
| <i>Danish</i> | Anden |
| <i>Dutch</i> | Ander |

In Latin the letter *l* corresponds to the *n* in Sanskrit and it becomes “*alter*.” In Greek the *n* is omitted, and it becomes in the Doric dialect *ἄτερος*, in the Attic *ἕτερος*.

In Old Saxon, Anglo-Saxon, and Old Frisian, the *n* is also omitted, and the word takes the form of *ather* and *other*, the *th* of the Low German and the *d* in the High German representing the dental *t* of the Sanskrit.

The adjectival form in Sanskrit is *anya*, which is represented by the

| | |
|--------------------|-----------------|
| <i>Greek</i> | ἄλλος for ἄλιος |
| <i>Latin</i> | Alius |
| <i>Gothic</i> | Aljis |
| <i>Anglo-Saxon</i> | Elles |
| <i>English</i> | Else |

The sense of *each* is expressed in Sanskrit by the same particle prefixed—*anudinam*, each day ; or by doubling the word—*ekaikah*, each one, *anyonyam*, each other.

Whether is descended from the Gothic *hwathai*, and means, literally, which separated thing, being compounded of the pronoun *was* (Sanskrit *kas*), and the separative or comparative particle *ter* or *ther*.

Either has a double descent. As a pronoun it comes from the Anglo-Saxon *æghwæther* contracted to *ægther*, signifying sometimes *both*, and sometimes *either* in the modern sense. *Either* as a conjunction is descended from Anglo-Saxon *oththe*, Gothic *aiththau*, German *oder*, and corresponds with the Greek η ; see Matthew vi, 24, xii, 33. *Or* is merely a contraction of *either*, for the sake of euphony.

In our old writers there is much confusion in the employment of these particles (Anglo-Saxon, Mark ii, 8, iii, 4, Luke vi, 8), Wickliffe uses the word *outher*—"No man may serve to two lordis ; for to the *outher* he schal hate the toon and love the tother, *outher* he schal susteyne the toon and dispise the tother." Robert of Gloucester uses "other" as equivalent to "or"—

" And there nas of olde house in the land non,
That he ne amendyde myd som land *other* myd byldinge,
Other myd boc, other ryche cloth, *other* ryche thynges."

He also uses *or*—

" *Other* he smote of the arm, *or* the hond, *or* the heved."

There can be little doubt that the words *either*, *other*, *whether*, had originally a dual relation, implying a comparison between two things only. Thus, in Sanskrit, *anyatara* means either of two, *anyatama*, one out of many. See Bopp I, 376. In the word *other* this dual sense has been entirely lost, but it appears still to linger in our use of *either* and *whether*.

A paper was then read of which the following is an abstract :

THE ARCH OF TITUS.

By HENRY DUCKWORTH, F.L.S., F.G.S., &c.

ON the highest point of the Via Sacra, and at the foot of the Palatine Hill, stands one of the most interesting relics of Ancient Rome—one of the most remarkable monuments in the world.

Those who are acquainted with its exposed position must have marvelled that any trace of it should exist at all—but the Arch of Titus had too wonderful a story to tell, to have been permitted to disappear utterly from the face of the earth.

The Senate and people anxious to record the glorious deeds of the conqueror of Judæa, resolved to erect and dedicate to him a triumphal arch, and hence arose the simple and elegant pile of which such considerable remains have been preserved to us in spite of the strifes and turmoils of eighteen centuries.

It is reasonable to suppose that this monument was commenced during the lifetime of Titus, but as we shall presently see, it was certainly not completed until after his death.

The site selected for the arch was the ridge of the Velia, the highest ground in the Via Sacra, and hence termed by the ancients the “Summa Sacra Via.” A finer and more commanding position could not well have been chosen, for on one side stood the Flavian Amphitheatre, or Colosseum; on the other, the Capitol and the Roman Forum.

Independently of historical associations, the Arch of Titus possesses much interest as a work of art, from its being one of the earliest examples of the Composite order with which we are acquainted. Some writers, indeed, have instanced it as the earliest known specimen of its class; but, as Barton correctly observes, the Temple of Augustus and Rome, at Melazzo, in Caria, has an indubitable claim to priority.

Unlike most structures of a similar class, erected at subsequent periods of the empire, the Arch of Titus has only one opening, a carriage-way, and hence it appears somewhat heavy when compared with the arches of Constantine and Septimius Severus, which have in addition two smaller sideways for foot-passengers.

The Arch of Titus is one of the smallest in Rome, its height not exceeding fifty feet, and its breadth forty-five feet. The stone employed in its construction was a beautiful white marble—but what remains of it is naturally much stained and blackened by age. Both façades appear to have been precisely similar, each being ornamented with two pairs of fluted composite columns, each pair resting on a single base, and having between them fenestral panels, instead of the bassi relievi usually placed there.

The frieze, a considerable portion of which still exists on the front of the arch facing the Colosseum, represents some of the ceremonies connected with the apotheosis or deification of Titus. A procession of sacrificing priests, and oxen, and the effigy of the emperor reclining on a couch borne by four men, are still plainly distinguishable, and perhaps they were still more so in the time of Donati, who makes special mention of this interesting feature in his learned treatise "*Roma vetus et recens*," written upwards of two hundred years ago.

The final act of the apotheosis is represented in the centre of the vault of the arch, where Titus is seen seated on the eagle of Olympus, which, with outstretched wings seems soaring to the stars. This bas-relief is somewhat inferior in point of execution, and, although the likeness of the emperor is apparently well preserved, there is a coarseness about the whole work that leaves an unfavorable impression upon the mind.

The sides of the archway are lined with the celebrated bas-reliefs, representing the finale of the procession of Titus to

the Capitol with the spoils from Jerusalem. These sculptures, which rank among the best specimens of Roman art extant, are executed in marble, and are twelve feet eight inches in length, and about seven feet seven inches in height.

The principal figure on the north-east side, i.e., the side on our right hand as we look towards the Capitol, is Titus himself, standing in a magnificent triumphal car drawn by four high-stepping steeds. The artist thus corroborates the statement of Josephus, that Vespasian and his son triumphed in separate chariots—at the same time it is worthy of note, that Orosius distinctly states, that they rode together in the same car,—a sight, he adds, perfectly novel to the Romans. I would not lay too much stress on the evidence afforded by the sculpture, for the arch being in honour of Titus alone, it is not likely that the artist would represent the incident otherwise than he has done.

The emperor who is attired in an ample toga, holds in his left hand the imperial sceptre, the greater part of which is now broken off—and the right hand no doubt grasped a bough of laurel, as was used on such occasions—no trace of this exists however, and the hand and a portion of the forepart of the arm are wanting.

On the occasion of a triumph it was customary for a public slave to stand behind the Imperator, and to hold over his head a golden Etruscan crown, decorated with jewels, in order to avert *invidia* and the influence of the evil eye. The slave is here replaced by a figure of Victory, with outstretched wings, and above the now shattered head of Titus may be discerned the remains of the laurel chaplet which she holds in her right hand. In her left hand she formerly bore, according to Donati, an Idumæan palm-bough, but no trace of this exists now, and the lower part of the arm is also wanting. The horses are led by a noble female figure, emblematical of Rome, and who regards with veneration and pride the occu-

pant of the quadriga. Her head is helmeted and in her right hand she bears a spear. As it is one of the most prominent, this is also one of the most mutilated in the whole series. The rest of the ground is occupied by four Lictors, bearing their proper insignia; and the fasces and laurel-crowned brows of the remaining eight appear above the heads of the horses and in front of the triumphal car.

The sculptures on the opposite side of the archway represent the principal spoils from the Temple of Jerusalem. The procession is represented as entering a triumphal arch, which is the first object on the extreme right. Next are seen eight laurel-crowned men, who bear upon their shoulders a ferculum, on which is placed the table of shew-bread, with its two acerræ or incense vessels, and the two silver trumpets resting cross-ways beneath it, on the narrow belt or border that connected the four legs (Exod. xxv, 25); whilst before them is carried a signum, which perhaps bore an inscription explanatory of their nature and history.

This group is immediately succeeded by another one carrying the candlestick in a similar manner on a ferculum, and preceded also by the descriptive signum.

The rich and massive cornice supported a somewhat heavy attic, in which were set very large and plain votive tablets. That on the south-east front, and which is almost entirely perfect, bears the following simple inscription, the letters of which were of bronze, sunk into the stone :—

SENATVS
POPVLVSQVE . ROMANVS
DIVO . TITO . DIVI . VESPASIANI . F
VESPASIANO . AVGVSTO

It is natural to suppose that an inscribed tablet formerly existed on the north-west attic, but no trace of it remains at the present day. According to Panvinus, Faunus, and other archæologists of the 16th century, a votive tablet, which was

discovered in their day, was believed to be the one in question. It is much to be regretted that this interesting relic was not preserved, as doubts have been entertained whether it ever had any connection with the arch of Titus—some writers contending that it originally stood over the principal entrance of the Circus Maximus; and it is worthy of remark that, whilst it was commonly described as having been found in the Forum, Martianus states that it was dug up in the Circus. “Hujus victoriæ fidem facit marmor quod in Circo in nostris temporibus fecit efforsum.” (*Urbis Romæ Topographia*, cap. iii, lib. iii.)

The inscription upon this tablet is said to have run thus:—

S.P.Q.R.

IMP . TITO . CAES . DIVI . VESPASIANI . FILIO
 VESPASIANO . AVG . PONT . MAX . TR . POT . X
 IMP . XVII . COS . XIII . P . P . PRINCIPI . SVO . QVI
 PRAECEPTIS . PATRIS . CONSILIISQ . ET
 AVSPICIIS . GENTEM . IVDAEORVM . DOMVIT
 ET . VRBEM . HIEROSOLYMAM . OMNIBVS . ANTE
 SE . DVCIBVS . REGIBVS . GENTIBVS . AVT . FRVSTRA
 PETITAM . AVT . INTENTATAM . DELEVIT

This inscription would thus appear to have been executed A.D. 81, and during the lifetime of Titus, for the epithet “divus” is not applied to him here; and hence it is not improbable that the arch was completed at that date, with the exception of the sculptures on the frieze, the apotheosis in the vault, and the extant inscription on the south-east attic. Nardini (*Roma vetus*, lib. iii, cap. xiii.), referring to the missing inscription, remarks—“In hac Divi nomen non legitur, unde et vivo Tito arcum positum conficere est;” and further—“Existimemus igitur vel arcum hunc vivente Tito inchoatum verum ob breve illius imperii tempus nondum absolutum fuisse, vel uti Anjelonus in *Historiâ Augusta* de hoc ipso agens Tito censet Divi titulum seu cognomen vivis

quoque non-nunquam Imperatoribus tribui solitum." But both Angelonus and Nardini seem altogether to overlook the representations of the emperor's consecration on the upper part of the arch, and which of themselves are a sufficient proof that he must have been deceased at the time of their execution.

Whilst antique representations of several of the Roman triumphal arches have been preserved to us, in the form of medals and cameos, we have none of the arch of Titus; which is to be regretted, as we are thereby unable to determine in what manner the upper part was finished. We may reasonably presume, however that it was ornamented with a bronze quadriga, such as we see represented in the commemoration coins of the arches of Drusus and Septimius Severus.

TWELFTH ORDINARY MEETING.

ROYAL INSTITUTION, April 20th, 1863.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

Mr. D. Marples was balloted for and duly elected an ordinary member.

Captain F. E. Baker, of the ship *Nippon*, was balloted for, and elected an Associate, on the recommendation of the Council.

Ladies had been invited to this meeting, and there was a numerous attendance.

The following paper was read:—

ON A
NEW THEORY OF THE GENERATION OF STEAM;
WITH AN
EXPLANATION OF THE GEYSERS OF ICELAND.

By E. J. REED, Esq., M.I.N.A.;

Chief Constructor of Her Majesty's Navy;

Hon. Member of the Literary and Philosophical Society of Liverpool.

IN venturing to address you this evening upon a new theory of the generation of steam, I cannot help feeling that some of you may be disposed to consider me unduly bold. The mere putting forward of a new theory upon such a subject may in itself be considered an act of temerity; and that I, who am almost a stranger among you, should presume to propound it here, may at first sight be thought an aggravation of the offence. I have grounds, however, for asking you to lay your censure upon me lightly; for, in the first place, the theory which I have to propound to you, although new, is by no means deficient of numerous and strong corroborations, several of which will be made manifest to you this evening; and, in the second place, it is no theory of my own, but is the result of experimental investigations that have been carried on for a series of years by a very distinguished townsman of yours, whose labours have tended largely not only to distinguish Liverpool in the world of science, but also to benefit it greatly in a commercial sense, by the establishment, so early as the year 1823, of steam trading vessels running between Liverpool and Dublin. I allude to my venerable friend, Mr. Charles Wye Williams.

Those of us who have been accustomed to scientific studies must oftentimes have felt, I think, that even the standard works of our language are deficient and contradictory in their representations concerning the generation of steam or vapour. It is impossible, in fact, to employ these words—"steam" and "vapour"*—without feeling the necessity of having their meanings more definitely fixed and limited in works of science; for hitherto some philosophers have used them indifferently, considering them synonymous; while others have been at some pains to draw distinctions between them. Dr. Thomson, for example, is careful to explain that water *evaporates* into vapour and *vaporizes* into steam. In his *Introduction to Meteorology*, he says:—

"Evaporation differs from vaporization in the amount of heat required for its production. Water *vaporizes* when it passes into *steam* at a temperature of 212° ; below that temperature it *evaporates*, passing into the ambient air in insensible moisture."

A distinguished man of science, writing in the *Encyclopædia Britannica*, states exactly the contrary of this, for he says:—

"*Evaporation*, in natural philosophy, is that process by which water and other liquids are converted into *steam*, an elastic fluid, and dissipated in the atmosphere."

In Main and Brown's work on *The Marine Steam Engine*—a work of authority, "designed chiefly for the use of the officers of Her Majesty's Navy"—we are carried back to Dr. Thomson's views, for the authors say:—

"To distinguish vapour from steam, vapour is formed only at the surface: steam from the body of the liquid. Evaporation proceeds at all temperatures. *Steam* is formed when the fluid has arrived at a certain fixed temperature [212°]. The formation of *steam* is a violent process; the formation of *vapour* is gradual and insensible."

Dr. Whewell, however, in entire disregard of these fanciful distinctions, as I think I may call them, freely employs the

* Throughout this discussion the word "vapour" must be supposed to stand for "vapour of water"—other vapours not being under consideration here.

word "steam" as strictly synonymous with the "aqueous vapour" of the atmosphere. In his *Bridgewater Treatise*, for example, he says :—

"Alternations of fair weather and showers appear to be much more favorable to vegetable and animal life than any uniform course of weather could have been. To produce this variety we have two antagonistic forces by the struggle of which such changes occur. *Steam* and air, two transparent and elastic fluids, expansible by heat, are in many respects and properties very like each other; yet the same heat similarly applied to the globe produces at the surface currents of these fluids tending in opposite directions. And these currents mix and balance, conspire and interfere, so that our trees and fields have alternately water and sunshine, &c."

Here, then, we have at the very outset, contradictions enough to embarrass any student; and it would be easy to multiply them largely if need were. But we have already encountered, as you may have observed, another confusion of terms. The words "vaporization" and "evaporation" have had peculiar meanings attached to them. According to Dr. Thomson, to vaporize means to convert into steam, and to evaporate means to convert into vapour; but according to the *Encyclopædia Britannica*, to evaporate means to convert into steam; while Turner, the eminent chemist, makes the word "ebullition" take the place of Dr. Thomson's "vaporization," and then gives one meaning to all the three words apparently, for he says :—

"Evaporation, as well as ebullition, consists in the formation of vapour, and the only assignable difference between them is, that the one takes place quietly, the other with the appearance of boiling."

Now as a first step towards giving soundness, consistency and unity to our knowledge of this subject, Mr. Williams sweeps away all this jumble of competing and conflicting phrases, and gives to each of the words "vaporization," "evaporation" and "ebullition" its distinct and legitimate meaning. The structure of each word defines what that

signification is. *Vaporization* (as applied to water) is clearly the conversion of water into vapour by means of heat; *evaporation* is as clearly the escape of vapour from water; and *ebullition* is that particular mode of evaporation which arises from the aggregation of the vapour into bubbles before and during its escape from the water. The distinction between the *generation* of vapour, and "its mere *escape* into the air, would appear so self-evident," says Mr. Williams, in his lately published work *On Heat in its Relations to Water and Steam*.*—a work to which I shall have occasion to refer very often this evening, and in which the author's views are fully and luminously set forth, "that it is the more extraordinary there should be any doubt on the subject, or any room for inaccuracy in describing their respective peculiarities. Nothing, however, is more common, even among writers of the highest authority, than to find the terms *vaporization* and *evaporation* not merely confounded and used as if they were synonymous, but actually reversed, and thus so misplaced as to lead to serious practical errors." We have already seen the truth of this statement; and I do not think there can be a single doubt in any mind that the definite meanings which Mr. Williams assigns to the words *vaporization*, *evaporation* and *ebullition* are just and proper, or that their uniform restriction to those senses would be of extreme service to science.

To the words "vapour" and "steam," he also assigns a definite meaning—the same meaning for both; and from what I have seen of the writings of Dr. Dalton, Dr. Whewell and other authors of the highest standing, there is full sanction for his doing so. Dalton expressly says that "vapour exists at all times in the atmosphere, and is *one and the same as steam*, or vapour at 212° and upwards." Among engineers it has been a habit, I know, to keep up a great distinction between the nature

* Longman and Co., London.

of ordinary vapour and that of steam, owing no doubt to the little occasion they have to consider the gaseous product of water and heat in any other than its more condensed and potent manifestations. But it is impossible to expatiate largely among the writings of chemists and of meteorologists without discovering that this great distinction is, after all, but imaginary, and that in their view, at any rate, steam and vapour are, as Dalton says, identical in character, the fiercest jet of steam being, in fact, nothing more or less than a compact stream of the self-same vapour that rises daily like incense from flower, and field, and sea, and floats in such beauty and splendour above us, that an inspired writer was constrained to ask, "Dost thou know the balancing of the clouds, the wonderful works of Him who is perfect in knowledge?"

But however consistent with some of the writings of great scientific authorities it may be to assume that there is no substantial difference between vapour and steam, and that the only difference is one of quantity, the author of our new theory has had not a few assertions of a contrary nature and of much weight to contend with. For, strange to say, most of our philosophers, when they have come to study and treat of steam generation, seem to have forgotten altogether those phenomena of vaporization and evaporation with which we are all perfectly familiar in daily life, and of which they themselves have given most brilliant expositions. It seems to be universally admitted by scientific writers that whenever an ocean, a river, a lake, or a body of water of any kind, is exposed to some degree of natural warmth, no matter how low the degree may be, the conversion of a portion of that water into vapour, and the speedy escape of that vapour into the air, invariably follow. So readily do this vaporization and evaporation take place, that we not unfrequently find the process designated "spontaneous evaporation." and repre-

sented as occurring "at all temperatures," no matter how inferior they be. Yet, no sooner do these philosophers begin to discourse to us of the application of artificial heat to water, than all remembrance of these obvious facts seems to die out, and we are told that the effect of the heat is (no longer to vaporise the water, but) to expand the heated portions of the fluid, which then rise to the surface, being succeeded below by other cooler portions thereof, and that thus a continued circulation of the fluid is kept up by a series of ascending and descending currents, until the whole body of it has been brought into contact with the source of heat and raised to 212° F., whereupon the generation of steam is commenced and continued as long as the heat is applied, or as any portion of the water remains. It would occupy a volume to explain in what diversified forms, and with what variety of so-called experimental illustration, this theory has been repeated in standard works of science. So firm a hold has it taken of the scientific world, that for my part I never heard it questioned in the slightest degree until I had the good fortune to make the acquaintance of my friend Mr. Williams, and to follow him through a course of reasoning and of experiment which had convinced him that it was invalid and inconsistent with facts.

And, on the very face of it, it does certainly seem remarkable that this theory of the mere heating and expanding effect of artificial heat applied to water should have been so implicitly accepted by us, when we remember that it takes no account whatever of a phenomenon which forces itself unceasingly upon the attention of every civilised person, viz. : the escape of copious volumes of steam or vapour from what is commonly called hot water. It may be true that this phenomenon has been reflected upon by many, and it is not improbable that those who have reflected upon it have found ways of reconciling it in their own minds, in some superficial

manner, with the current theory ; but a very little quantitative experimentation is sufficient to show that no theory can be satisfactory that does not provide a very considerable place for the phenomenon in question.

It is scarcely possible to enter, however superficially, upon an experimental inquiry into this subject without speedily encountering, as Mr. Williams has shown, proofs of the fact that in art, as in nature, the generation of vapour is, to say the least, a very early consequence of the application of heat to water. Take a champagne glass, and pour into it some cold water, allowing the glass to stand upon the table as you do so ; upon the top of the glass place a glass saucer, and into that also pour a little cold water ; let them alone, and they will remain, for a time at least, as they are. But take up the champagne glass in your warm hand, clasping it therein as completely as possible, and you will soon find a vapour rise from the water within it, and deposit itself in the form of mist upon the glass saucer, which is speedily obscured by it. The mere heat withdrawn from your hand will suffice to generate a visible and tangible body of vapour. Or vary the experiment, and perform it after the manner of one of Mr. Williams's earliest illustrations. Take a flat-bottomed glass vessel capable of holding 6 or 8 pounds of water. Pour in as much water of the temperature of the surrounding air as will cover the bottom, and on the top of the vessel lay a glass saucer containing cold water as before. Now simply stand the glass vessel on a piece of hot flannel, and almost instantaneously vapour will rise, fill the glass, and be condensed on the saucer above. Again, instead of placing the glass vessel in this last case upon hot flannel, suspend it upon a holder above a spirit lamp or a gas jet, and the selfsame result will follow.

Here then we are shown, by experiments of a most simple questionable nature, that a very early, in fact an in-

stantaneous, effect of applying artificial heat to water, is the generation of vapour. Whether the heat heats the water as water, or expands it as water, or not, it indubitably converts a portion of the water into vapour; and as men of sense and of science we are bound to demand that this fact be recognised by every theorist, and admitted into every theory that is put forward upon the subject. In the physical world phenomena of precisely the same kind, play most important and astonishing parts. The weight of the atmosphere has been computed at above 4,000,000,000,000,000 of tons; and the aqueous portion of it, which is constantly undergoing partial alternate condensation and vaporization, is supposed to vary from 1-100th to 1-20th of the whole; so that an ocean of vapour weighing never less than, say, 40,000,000,000,000 tons is suspended above us, and although subject continually to condensation on hills and mountains, and in a hundred other ways, yet is no less continually maintained at this enormous proportion by the silent process of natural vaporization. We talk of our steam power, and we are told that the product of our British coal mines is so great that we might derive from them annually an amount of power equivalent to that of an army of 5,000,000 of fresh men. But even if this power were all realized by the agency of steam, how far short would it not fall of that immeasurable energy thus silently exerted by the vaporising action of the sun upon land and sea? Nor is this wondrous agency less beneficent than powerful. In an article published only this month by the eloquent Herschel* we are told, what we otherwise know, that "Professor Tyndall has recently shown that it is entirely to the moisture existing in the air that our atmosphere owes its power of confining and cherishing as it were the heat which is always endeavouring to radiate away from the earth's surface into space. Pure

* See "The Sun," by Sir J. F. W. Herschel, Bart., in *Good Words*, for April, 1863.

air is *perfectly* transparent to terrestrial heat, so that, but for the moisture present in the atmosphere, every night would place the earth's surface as it were in contact with that intense cold which we are certain exists in empty space No animal or vegetable could resist such a frost for an hour, any more than it could live for an hour in boiling water." We all know, also, how the aqueous vapour of the atmosphere tempers the sun's beams in torrid climes, and by its fluctuations assists in fanning the tropical coasts with land and sea breezes, and by its ascent and descent performs that magnificent meteorological paradox which the comprehensive eye of King Solomon discerned when he exclaimed, "All the rivers run into the sea, yet the sea is not full; into the place from whence the rivers came, thither they return again."*

When the subject first came under my notice, Mr. Williams drew my attention to the fact that in the experiments which I have just recited, the rise of the generated vapour, and its diffusion through the superior liquid, were plainly visible to the eye under certain optical circumstances—a discovery which seems to have escaped all previous experimenters, and to have been reserved as a great reward for the scientific ardour and fidelity of my excellent friend. It was with no small pleasure, I assure you, that I first witnessed this simple but most beautiful phenomenon. Instead of ascending and descending currents, as described by all previous writers, we have a continuous movement *upwards* of cloud-like vapour. It occurred to me to ask if it were not practicable to exhibit this phenomenon artificially, and on a large scale, by the use of some special optical appliances. I found that Mr. Williams had anticipated me in the idea, and had applied to an experienced optician for suitable apparatus. Unhappily the attempt at that time failed. I am delighted to tell you, however, that success has since been achieved; and I have

* Ecclesiastes, i. 7.

now the very great pleasure of inviting your attention to an experiment which I am pretty sure will be successful, because it has been most kindly undertaken by my very accomplished and distinguished scientific friend, Dr. Edwards. You will observe that almost as soon as the heat of the lamp is applied to the bottom of the glass vessel containing water a copious and continuous flow of cloud-like vapour ascends through the fluid, and escapes into the air. Here then we have visibly demonstrated a most important feature of Mr. Williams's theory, viz. : that the consequence of applying heat to water is not to heat and expand that water—or, at any rate, not solely to heat and expand it—but to generate volumes of steam or vapour.

It may, however, occur to some persons that it is just possible that these visible forms and movements are not really proofs of an actual conversion of water into vapour, but merely optical effects resulting from that upward movement of portions of water which, in accordance with the ordinary theory, are heated below and ascend to the surface. A little reflection will suffice, however, to convince you that this is not the case. In the first place, the promptness with which these cloud-like forms are produced, the speed with which they rise, the quickness with which they succeed each other, and above all the great expansion (both vertical and *lateral*) which they undergo—all these conditions of the phenomenon render the conjecture in question extremely improbable, not to say impossible. But more than this. If these visible effects were produced by actual elevations of volumes of *water*, and if the body of water experimented upon had had suspended in it solid substances of a specific gravity very closely approximating to unity—that is to say, if it had contained substances which, being of just about the same weight as water, bulk for bulk, would float in equilibrium in any part of the fluid—then these substances (such as bran or

world of necessity have been disturbed
 of these currents of expanded water.
 before us, however, we can show you that
 have taken place. We can show you
 suspended with the utmost delicacy—that
 gravity most exactly balanced by their
 and which are therefore free to rise and fall in per-
 to a liquid current, and yet they remain at rest
 while these visible currents flow past and over them most freely
 and quietly. They are not, therefore, currents of water, but
 of a far lighter and finer fluid rising through the
 water—currents, in short, of extremely thin vapour or steam.
 By applying heat very rapidly or very intensely at one spot,
 it is quite possible, of course, to produce disturbances among
 these floating substances; but that it is equally possible to
 avoid this effect by a more gradual application is sufficient

these beautiful expanding and ascending
 of a less substantial fluid than that upon
 ghty navies of the world are tossed like
 of all proofs that this is vapour, and not
 as presented to us in the fact, that on
 it escapes from the water, and rises
 clouds which need no special optical
 means to make them visible.

before us we are well entitled to draw
 inferences.

is, that the statement which is so con-
 stantly put forward concerning the forma-
 tion at the *surface* of water only, is wholly
 false. As we have seen, while
 they call "steam" is formed in the body
 that "vapour" is formed at the surface
 implies the same thing when he says:—
 vapour is formed in every part of its

dimensions, and more particularly in those parts which are nearest the source of heat; but liquids *generate vapour* from their *surfaces* at all temperatures."

It would be easy to multiply statements of this kind to a very large extent, but it is not necessary to do so. It must be well known to you that the doctrine in question is a very common one. But we have been taught by the experiments that you have witnessed that it is untrue. The vapour is manifestly formed, as we had a perfect right to anticipate, at the place where the heat is applied, wherever that may be.

The next inference to be drawn is that water, even when of a low temperature, does not condense steam or vapour,—that is, does not re-convert it into water. This is a doctrine so contrary to widely received opinions that one can hardly expect you to sanction it with readiness. But have we not seen, in the experiments of this evening, the steam which has been formed at the bottom of the several vessels of water rise up uncondensed through the superincumbent body of liquid, and escape as steam at the surface? If cold water can condense steam at all, why has it not condensed these small and feeble streams long before they have reached the surface—as soon, in fact, as they have been generated? The circumstances were the most favourable for condensation that can be imagined. The water was cold, the steam* extremely small in quantity, and the intermixture of the two perfect; yet the vapour came forth as vapour, and rose into the air as if to render all further doubt of its immunity from condensation by the parent liquid absolutely unquestionable!

Further, on looking at the subject thoughtfully, you will speedily discover that if water (or, to say the least, water of such temperatures as we have been dealing with) had the power of condensing the vapour, it would be impossible for the vapour which we have seen ever to have been formed at

* In accordance with what I have previously stated, I am here employing the words "steam" and "vapour" synonymously.—E. J. R.

all within the body of the liquid. For the condensation of vapour must manifestly consist in the abstraction of heat from it, and the heat abstracted must of course be supposed to combine with the condensing water. But we have previously seen that when heat is imparted to water, the earliest effect (or say one of the earliest effects) is to convert that water into vapour. So that, according to the hypothesis here under notice, one aqueous particle or set of particles would require to possess a greater affinity for heat than another particle or set of particles—a supposition which is in the last degree improbable, and which after all would not get rid of the vapour for us.

The next inference is therefore, that water is capable of containing, and when what is called warm or hot, in common parlance, does contain, an amount of uncondensed vapour or steam. Mr. Williams, in his work before referred to, has recorded the results of many beautiful experiments illustrative of this doctrine; but you will perhaps excuse me if I show you one which I myself proposed some time ago expressly to test the truth of it. It occurred to me that, if it be true that water has no power of condensing steam, but is capable of containing large quantities of the latter uncondensed, it would be easy to accumulate a visible volume of it in a body of water considerably below what is called the boiling point. I accordingly took a glass vessel containing a few pounds of water out of which the air that usually pervades water had been driven, and into this vessel and this water I lowered a glass saucer, inverting it after it was immersed, and provided supports which kept it a little up from the bottom of the containing vessel in order that the water might be perfectly free to circulate all around it, if it were disposed to do so. I then applied heat to the bottom of the containing glass vessel, and after a short time a bubble of steam began to accumulate beneath the saucer. Long before 212° was indicated by ther-

mometers immersed in the liquid about and below the saucer—before even 200° was reached—this volume of steam accumulated sufficiently to exert a pressure which lifted the saucer up and allowed it to escape, and to rise up through the superincumbent water into the air above.

It would be easy to shew you this experiment, but I have devised a modified form of it, in which the effect is rendered more visible, and which I will now exhibit to you. I have here such a glass vessel containing water as I have described ; and I have here a smaller glass vessel to which I have attached an iron ring that is intended to act as a sort of anchor. This smaller vessel will take the place of the saucer before mentioned, and the anchor will have the effect of keeping the small immersed vessel always upright, with the steam within it. With this arrangement, you see that while the water is considerably below boiling point, steam accumulates in the small vessel until, on a sufficient quantity being collected, that vessel is lifted up by its pressure, and its cable so to speak is put in tension. Having waited a while, we now see the upward pressure is sufficiently increased (owing to the further accumulation of steam) to “trip the anchor”—to use a nautical phrase ; after another short period, the anchor is now “weighed,” and finally the vessel, anchor and all, is, as you see, carried bodily upward to the surface. On protruding into the atmosphere, the glass is cooled down, a portion of the steam within it becomes condensed by the cool glass, and the whole descends again to the bottom. By applying the heat still longer, those various movements are repeated and thus an opportunity is afforded you not only of seeing a volume of steam immersed in comparatively cool water, but also of witnessing a series of mechanical operations, which require a considerable exertion of force, actually performed by the body of steam so circumstanced.

In order to demonstrate even more conclusively, if possible,

the inability of water of comparatively low temperatures to condense steam, I suggested another experiment, which it is perfectly impossible, I believe, to gainsay. I fitted up a glass funnel to take the place of the inner glass vessel mentioned in the last experiment, with the bulb of a thermometer in its interior, the graduated stem of the thermometer passing up steam-tight through the stem of the funnel. Performing the experiment as before, the volume of steam was accumulated in the upper portion of the vessel, immediately above the bulb of the thermometer, and, on withdrawing the heating lamp, there the steam remained in absolute contact with water which the thermometer plainly showed to be of less than 200° ; in fact, the thermometric indication falls as low as 150° , and even lower still, before the bubble of steam disappears.

I do not think it possible, in the face of experiments like these, to doubt that the common theory urgently demands revision.

It now becomes necessary to explain what philosophical grounds we have, independent of the before-mentioned experiments, for believing that steam or vapour is formed by the application of heat even in extremely small quantities, to water; and on what principles its prompt diffusion through the body of water may be accounted for.

Without accepting the atomic theory of matter as a demonstrated philosophical truth, but receiving it, with Dr. Whewell, as an admissible "mode of expressing and calculating laws of nature," we may consider gases as each consisting of some ponderable base united with some repellent agent, such as heat (and perhaps with some other elements which we agree to term imponderable fluids); for, as Dr. Faraday says, "when we speak of the gaseous state as being due to the mutual repulsion of the particles, or of their atmospheres, although we may err in imagining each particle to be a little nucleus to an atmosphere of heat, or electricity, or any other agent, we

are still not likely to be in error in considering the elasticity as dependent on mutuality of action." Now we know that vapour consists of what we may call a base, composed of combined oxygen and hydrogen, invested, by means of heat, with this elastic character; and that its particles do exert among each other that "mutuality of action" of which Dr. Faraday speaks with confidence—the action being, as we know, essentially and invariably repellant. In fact we have Dalton's own authority for saying that "vapour cannot, on any scientific principle, be classed in a distinct category from elastic fluids, retaining its elasticity and repulsive power among its own particles." Further, we know, from abundant experience, that the conversion of *water*, the particles of which attract each other so strenuously, into *vapour* whose particles repel each other no less strenuously, is effected by extremely small quantities of heat. We know that the mere heat of the atmosphere produces in plants an amount of vaporization and evaporation which is one of the great means by which their crude fluids become inspissated and altered in their nature, and by which the life of the plants is thus maintained. We know also that the moderate heat of the human body is sufficient to vaporize the liquids that escape through the delicate sudoriferous ducts of the skin, and that this vaporizing process is essential to the healthy action of the human mechanism. We know further that it is by a vaporizing process carried on at comparatively low temperatures that the mighty mass of aerial vapour, to which I have previously referred, is uplifted from land and sea, and made to conform to the beneficent purposes of the author of the universe. It is then a departure—a singular and extreme departure—from what we know to be going on all around us, to suppose that increments of heat, however small, will not convert proportionate quantities of water into steam, and it is for the maintainers of the ordinary doctrine of steam generation to show

on what grounds they commit such a departure from widely recognised principles as to assume that a temperature of 212° is essential to its formation.

We see, therefore, that apart altogether from the special experiments which we have before considered, we have good philosophical grounds for assuming that the effect of applying artificial heat to water is at once to generate a volume of steam. We have next to inquire what we must philosophically expect to become of the steam so generated—an inquiry that need cause us but little trouble. That doctrine of the mutuality of repellant action among the atoms of gases with which we are now familiar, indicates to us at once that this steam will expand and diffuse itself throughout the interior of the containing vessel. If the vessel be closed the steam will (unless cooled down) remain thus diffused throughout it; if open, it will, of course, go on expanding out into the atmosphere. The complete diffusion will take place, and the vapour will pervade the whole vessel as effectually as if the water were not there. This fact is well known to have been distinctly laid down by Dalton in respect of gases. “Gases mechanically mixed with water,” he says, “retain their elasticity or repulsive power amongst their own particles just the same in water as out of it, the intervening water having no other influence, in this respect, than a mere vacuum.” When we conjoin with this statement his previous one—viz., that vapour cannot be considered different to other elastic fluids as regards elasticity and repulsive power—we see how closely this great master of science approached to the theory which I am bringing to your notice. It does not appear, however, that Dalton ever grasped the full purport of these doctrines. It has been reserved to Mr. Williams to consummate the labours of his predecessor, and to establish in all its simplicity and beauty the theory that the vapour of water, like any gas, is free to diffuse itself through water of all temper-

atures, and that it is not annihilated by the parent fluid, as has heretofore been supposed.

And it may not be amiss to state in this connection that there is a peculiar fitness in the circumstance of this discovery proceeding from my venerable friend. Mr. Williams was in early life, and before Dalton announced his discoveries, a pupil of the celebrated William Higgins, of Dublin, whom Davy acknowledged to be the first discoverer of the modern form of the atomic theory. From the lips of Higgins he listened to the earliest enunciation of that theory, and later in life, not only became an earnest student of Dalton's writings, but delivered at Manchester a lecture treating largely of gaseous diffusion, at which Dalton himself presided, and which received the full approbation of that illustrious man. It is in the steps of Dalton that Mr. Williams has, in this matter, been content to tread, as he has emphatically stated more than once. In his work before referred to,* he quotes the sentence of Dalton which I last cited and adds, "This is all that is here contended for. This is literally true when vapour is mixed with water. Its denial would but again raise the question whether vapour was or was not an elastic fluid,"—which Dalton himself distinctly says it is, as we have seen. I should not do justice, however, to my own deep sense of the nature of Mr. Williams's labours if I did not clearly state that his researches are very much more than completions of Dalton's inquiries into certain physical problems. Mr. Williams' work opens up, and casts a brilliant light into many questions which Dalton does not appear to have investigated at all; and although I do not consider the work altogether free from blemishes, it is, in my judgment, a most splendid contribution to modern science.

And this leads me to speak of a class of phenomena to which but little attention has hitherto been given; concern-

* C. W. Williams "On Heat in its Relations to Water and Steam." Longman and Co., London; Webb, Liverpool.

ing which Mr. Williams has made several remarkable discoveries ; and which is, in my opinion, inexplicable under any other theory than that which he has laid down. I allude to the ebullition excited by the introduction of foreign substances into masses of water to which considerable heat has been applied. The treatment of this part of the subject will necessarily involve a discussion of what is denominated by philosophers "the boiling point" of water.

The following words, extracted from Dr. D. B. Reid's *Elements of Chemistry*, contains a somewhat succinct, and yet sufficiently explicit, statement of the received doctrine concerning this subject :—

"At 212° boiling water produces steam, having barely sufficient elasticity to overcome the pressure of the air, and rise against it. Water does not attain a higher temperature under ordinary circumstances, as the steam then escapes, carrying along with it all the excess of heat communicated to the water."

Professor Gmelin, in treating of this question, says :—

"Since elasticity increases with the temperature, there exists for each body a certain temperature at which the elasticity of its vapour is a balance for the pressure of the atmosphere, and consequently cannot be restrained by that pressure. This temperature is the boiling point of the body. At this point it passes into vapour in spite of the atmospheric pressure, as soon as the additional heat required to volatilize it is supplied."

That variations occur in the temperature of the boiling point under changes of atmospheric pressure, and certain other circumstances, is generally acknowledged. Sir Robert Kane, for example, says that water boils in a glass or porcelain vessel under a pressure of 30 inches of mercury (the ordinary atmospheric pressure), not at 212°, but at 214° ; and he goes on to say, that in graduating a thermometer it is necessary to use metallic vessels, for the metal "appears to favour ebullition by the minute irregularities of its surface affording a nucleus for steam to form." If the smooth surface of the glass, he

adds, be removed in a single point by a scratch with a diamond “the bubbles of steam will be seen to form *there* before the general mass of the liquid begins to boil.” Professor Miller states that the adhesion of the fluid to the surface of the vessel containing it, “has a marked effect in raising the boiling point,” in consequence of which, he adds, “water sometimes boils at 214° , if a pinch of metallic filings be dropped in.” It is also stated by him and by some other authors that the expulsion of air from water elevates the boiling point very considerably—so considerably that the temperature and pressure sometimes rise sufficiently high without producing boiling to convert the ebullition, when it does take place, into a powerful explosion. Professor Brande reasserts that the adhesion of the fluid elevates the boiling point. He says :—

“The influence of the quality of the surface of the vessel, its cleanliness and other circumstances, upon the boiling point of water has been examined by F. Marcet. He found that in glass flasks the boiling point varied with the quality of the glass, fluctuating between 100° and 102° of the centigrade scale [212° and 215.6° Fahrenheit]. If the glass vessel be perfectly cleared by solution of potassa, or by sulphuric acid, and all chemical and mechanical matter removed, water may be raised in it, without boiling, to 105° C. [221° F.] In all these cases the degree of adhesion between the water and its containing vessel appears to be the cause of the fluctuation at which boiling ensues.”

In the *Treatise on Heat*, by Professor Dixon, of Trinity College, Dublin, we read :—

“This subject has been examined with particular care by M. Magnus and M. Donny, and we propose to lay before the student the views of these writers on the process of ebullition. M. Magnus remarked, what had been observed by previous physicists, that water which has been well boiled does not generally pass into the form of a steam in glass vessels until it has acquired a temperature considerably above that due to the force of its vapour, and that the formation of steam then takes place suddenly and with great violence. From this it follows that the force requisite for the disengagement of the

steam is greater than its expansive force subsequently, and the difference of these forces, M. Magnus refers to the attraction of cohesion existing between the particles of the liquid, which requires to be overcome at the moment of formation of the steam, in addition to those pressures which the vapour itself subsequently sustains. . . . Accordingly, sawdust or insoluble powders, diffused through the fluid mass, and the sides of a metallic vessel, which, as is well known, are never completely moistened at all points by water, lower the temperature of ebullition to that of vapour."

In Professor Faraday's *Chemical Manipulations* the effect which the introduction of foreign substances has upon the process of ebullition—and which we have already seen incidentally and somewhat ambiguously mentioned by Professor Miller—is noticed at some length. The author says:—

"The evolution of vapour is in many cases much facilitated by the addition of substances having apparently no chemical action; and the process of distillation is not only thus facilitated, but rendered possible and easy in cases where otherwise it would be almost unattainable. If diluted alcohol, spirits of wine, or certain alcoholic solutions be distilled in glass vessels, the vapour is frequently evolved with difficulty; the contents of the retort at one moment not boiling at all, and at another bursting throughout into a mass of vapour and fluid, which fills the whole body of the vessel. This endangers the sudden expulsion of part of the substance, causing serious derangement of the process, and is also accompanied with such agitation of the fluid—such bumping and shaking of the retort—as at times actually to endanger the safety of the whole; for when the vapour is formed, it is with such force as to produce a dull explosion. This is prevented by the introduction of a few angular or fragmented pieces of solid matter into the retort, of such nature as not to be acted upon by any of the substances present."

Now, if these passages are carefully examined, it will be seen that one doctrine pervades the whole of them, and is in most instances as distinctly expressed as it is possible for language to express it. That doctrine is, that at a certain temperature, which may be varied within given limits, and which is known as the boiling point, water to which successive

increments of heat have been applied *begins* to be converted into steam. In other words, that steam is not formed during the heating process until the boiling point has been attained. Dr. Reid plainly says that it is at 212° (and by implication not below that), that water "produces steam." Professor Gmelin no less plainly says, that at the boiling point the water "passes into vapour." Sir Robert Kane clearly implies that at 212° in metallic vessels, and at 214° in glass or porcelain vessels, the opportunity is afforded for "steam to form." In the statement of M. Magnus's views given by Professor Dixon, we read of water "passing into the form of steam," and of the "formation of steam" taking place "suddenly and with great violence." And in Professor Faraday's more practical remarks we read of the contents of a retort in a moment "bursting throughout into a mass of vapour and fluid;" and also of vapour being "*formed* with such force as to produce a dull explosion."

If we turn from these citations, and from the received opinions which they express, to the theory of Mr. Williams which is now before us, we shall find, I think, much of the mystery and confusion of this apparently intricate subject vanish. According to this theory, when heat is applied to water, steam is formed, and goes on accumulating in the liquid from the moment the heating process commences. If the containing vessel be open to the atmosphere, part of the steam so formed will of course escape from the surface; but under ordinary circumstances, the escape will not be sufficiently rapid to provide for the exit of all the newly-formed steam, and the latter will therefore go on accumulating, as I have said, in the liquid. After awhile this accumulation will become so great as to thoroughly saturate the liquid; or, in other words, to fill it with as much steam as it can contain under its existing circumstances, or under the forces to which it happens to be subject. From that moment, the whole of the steam subse-

quently formed, or its equivalent in quantity, will, if ebullition be favoured, urge its way out of the liquid, with more or less violence according to its quantity and to its facility of exit. But, let it now be observed that while the imprisoning or restraining forces—the atmospheric pressure, and the molecular cohesive forces of the liquid—may, for a single experiment, be considered constant (*i. e.* invariable in amount), or nearly so, the expulsive forces impressed upon the steam may be varied in many ways. It is highly probable, for example, that the gaseous forces are either partly or wholly thermo-electric; and that the pressure of roughened surfaces, or of foreign substances, in the body of, or in contact with, the vapour, may therefore exert an important influence upon it. They may, for instance, exert an attractive or aggregative influence, and consequently cause the diffused vapour to rush towards them. This rushing together of the gaseous particles would favour the formation of bubbles; and no sooner would bubbles be formed than the liquid pressures would exert upward forces upon them, and expel them summarily at the surface. In this way, then, it is easy to see that the period at which ebullition, or the violent escape of steam in the form of bubbles, commences, may be varied by varying the character either of the surface of the vessel containing the liquid to be heated, or by immersing in, or extracting from the liquid, solid impurities; and in this way the term “boiling point” may have a definite meaning affixed to it, and its observed variations be satisfactorily accounted for.

We are now in a position, I think, to understand what Mr. Williams states as the “cardinal facts” of this branch of his theory, viz. :—

“1st. That ebullition, or the formation of bubbles, is nothing but the sudden aggregation or grouping of myriads of atoms of vapour *already formed* and existing *in the liquid mass*, and rushing into contact with some motes or points of foreign matter, accidentally or intentionally presented to them.

" 2nd. That these aggregates are composed exclusively of such vapour atoms as are in excess of the saturating quantity.

" 3rd. That the quantity of vapour required for the saturation of any liquid has a fixed relation on the one hand to its density, and on the other, to the repellant action which its constituent atoms individually exercise, whether the liquid medium be water, ether, alcohol, oil, or mercury.

" 4th. That ebullition has no relation to the quantity or number of liquid atoms converted into vapour atoms, from any given surface, but to the number of such atoms that may have been enabled to form such groupings or aggregates.

" 5th. That without those groupings or aggregates, the vapour atoms, as they are successively formed, would individually rise, though invisible (by virtue of their separate enlarged volumes and diminished specific gravity), to the surface, and from that surface into the air."

The experimental facts which Mr. Williams adduces in support of these views, and the whole of which I have repeatedly verified by experiments of my own, are extremely interesting and significant. If we take a glass flask or bottle containing clear well-distilled water, and freed from all foreign matter by filtration, with a perfectly clean thermometer inserted in it, and apply heat gradually until a temperature of, say, 215° has been attained, we shall find that no commotion, or motion of any kind, will thus far be produced in the water. But now dip for a moment into the water the end of a fine rod, or the tip of a feather, and instantaneously a violent commotion and a voluminous discharge of steam will take place around it. Withdraw the rod or feather, and lower a minute piece of brick, or coal, or any other such substance into the water, and that, no less instantaneously, becomes a centre of agitation, and of copious ebullition. Withdraw it, and plunge a rod or stick well down into the body of the water, and straightway a most violent and abundant discharge of steam will occur, and if the rod or stick be held there for a second or two only, the discharge will lower the temperature to 212° or thereabouts, and the agitation will subside. If, after these experiments, a

small loose solid mote or two is found to have been left behind, then, if the application of the heat is still continued, it will be seen that every such mote becomes a centre of local ebullition, and, move about as it may, carries with it the power of collecting the steam in globules, which ascend in a continuous stream to the surface of the liquid.

Now the question is whether the feather, the rod, the fragment of brick or coal, and the motes employed in these experiments, are the occasions of steam being *generated* in the instantaneous manner described, or merely the occasions for steam already generated to discharge itself? It is just possible perhaps, to conceive of water, as water, resisting the vaporizing action of heat up to a certain point, and then undergoing a sudden and violent transformation into steam when subjected to the action (of whatever nature that action may be) of these foreign bodies. But so far as I am aware we know nothing that can justify us in assuming the existence of any such state of things; on the contrary we know perfectly well that the application of heat to the water in these very experiments has converted much of it into steam, part of that steam having escaped, and part having remained in the water; and with the evidence now before us, it seems exceedingly probable that by the time a temperature of 212° is attained, a complete saturation of the body of liquid by the steam, has been effected. If this be so, then, when the exalted thermo-electric condition of the mass of steam is considered, we may well expect, I think, to find it rushing into globules and bubbles the moment a foreign body of a wholly different kind is introduced. This explanation of the experimental phenomena in question appears to me to be a far more feasible one than any that I can frame in conformity with the commonly-received doctrine. I believe, with Mr. Williams, that "we have no alternative but the conclusion that the rod or other body introduced has merely acted the part of a nucleus

of attraction for the vapour generated over the entire bottom surface of the vessel."

I will only add the following summary of the principles laid down by Mr. Williams :—

" 1st. That water, or its atoms, can neither be *heated* nor *expanded*, and still retain the character of liquidity.

" 2nd. That the prevailing theories as regards *ebullition*, are altogether erroneous.

" 3rd. That the so called *boiling point*, as regards temperature, is merely that point at which the water is charged with vapour *to saturation*, under the true Daltonian theory, the water acting the part of a mere *vacuum or medium*.

" 4th. That we have strong grounds for believing that there is no difference between the *cause* which produces divergence and mutual repulsion among the atoms of a liquid on becoming vapour, and that which produces a similar divergence and repulsion in the pith-balls or gold leaves of the electroscope.

" 5th. That if there be such a thing as *Thermo-Electricity*, we are warranted in concluding that it acts, in the same way, and on a similar principle, on atoms of a liquid as on those of other bodies.

" 6th. That we have rational grounds for believing that *explosions* in steam-boilers are frequently the result of the accumulated steam (present in the body of the water) being suddenly released by the removal of the pressure from the *denser* medium of the water into the *lighter* one of the air.*

" 7th. That Watt's theory of steam being *condensed*, and reconverted into the liquid state, by the direct action of cold water, is altogether erroneous.

" 8th. That vapour or steam cannot give out its heat to water, and is but mixed, *mechanically*, with it, on the true Daltonian theory."

Such then are some of the leading discoveries and conclusions which we owe to Mr. Williams, and I feel confident

* This theory of explosions (which contrasts so strongly with that which has lately obtained the greatest currency—that of explosions resulting always from deficiency of water) deserves, in my opinion, very serious attention. In his work already referred to, Mr. Williams furnishes facts which singularly corroborate it.—E. J. R.

that, even while laying aside all that personal regard which his long and honourable residence among you must have excited in your minds, you will agree with me in believing that, as students and lovers of science, we must heartily admire both the zeal and the genius which he has brought to bear upon this profound and intricate subject. It is a subject in connection with which great successes have been achieved, and great reputations made; but when I compare the confused and conflicting doctrines enunciated in our existing works, with the clear and harmonious principles now presented to us in his recent writings, I cannot help thinking that the name of Mr. Williams deserves, and will ere long attain, a place as high and as illustrious as those of even the most distinguished discoverers in this beautiful and profound branch of science.

It only remains for me to add a few words on the perfect manner in which this new theory accounts for the phenomena of the Geysers of Iceland. These have, of late years, been made so familiar to all by books of travel, and in other ways, that I need not describe them at length. They may briefly be said to consist of more or less violent discharges of steam and what is called boiling water from subterranean sources, each through an upright tube, which opens out above into a capacious basin. In accounting for these hot springs, the existence of subterranean heat is, of course, always assumed; but opinion has been greatly divided as to the *modus operandi* of its application. One class of writers, of whom Sir George Mackenzie may be taken as the representative, considers that sudden evolutions of heat occur; that these have the effect of generating volumes of steam, which accumulate in cavities with sufficient pressure to sustain the column of water in the Geyser tube; and that further sudden accessions of heat and steam produce vertical oscillations in this column of water, during which the steam finds opportunity to escape, and carries up with it a great part of the water. Another class

of writers have adopted a theory put forward by Bunsen, in which the Geyser tube alone, without a subterranean cavern, is supposed to contain water, heat being applied to the tube itself, and the relief of pressure which results from the elevation of the upper portion of the water playing an important part in the operation. In this case, however, as in the former, the notion of steam being *suddenly* generated is preserved, heated rocks being supposed to furnish the necessary supply of local heat.

Now, Mr. Williams's theory most amply and beautifully accounts for all the phenomena of these Geysers, without assuming the existence either of intense local heat, or of sudden evolutions of heat. Simply assuming the existence of a subterranean heat of some kind—and all now admit the existence of that—also the presence of water in and below the tube, and, in his view, the generation and accumulation of steam must take place. As the quantity of this steam goes on increasing, the moment will arrive when the saturation of the water will have taken place, and after that a more or less violent discharge of steam must follow. It seems reasonable to suppose that the Geyser tube is not an isolated reservoir, and that it opens into wells or springs below of greater or less extent; and in this way the enormous amount of the discharges that issue from these Geysers may be accounted for, whereas, the tube alone seems of wholly insufficient capacity to supply them.

I would now ask you to observe the apparatus which we have here, and which Mr. Williams himself constructed. It consists simply of a tube opening into a vessel of water below, and a basin above, the tube and lower vessel being filled with water which rises up and partly fills the basin. Heat is now applied below; steam is, as we think, accumulating in the water; now you hear explosive sounds and observe commotion in the fluid; and now a violent and copious

discharge of steam and water bursts, Geyser-like, from the basin. The action now subsides ; the water returns from the basin down the tube to the reservoir below ; and presently all these phenomena will repeat themselves, just as they do in nature. The Geyser, then, like the miniature working model before us, consists of a large reservoir below, a single tube or orifice of exit, and a basin above which receives a large portion of the ejected water, to be returned to the reservoir below. This reservoir being necessarily full of water, the steam generated must remain and accumulate in it until the point of saturation has been reached, which will depend on the height of the column of water in the vertical tube of exit, the temperature in the reservoir corresponding with that elevation. In the miniature that temperature is found to be 215° when the discharge takes place. In the Geyser, this must be considerably higher, the tube of exit being there 47 feet. We thus see that the Geyser and its miniature correspond in action and result.

THIRTEENTH ORDINARY MEETING.

ROYAL INSTITUTION, May 4th, 1868.

WILLIAM IHNE, PH.D., PRESIDENT, in the Chair.

Messrs. James Lister, and Francis J. Bailey, M.R.C.S., were balloted for and elected ordinary members.

It was announced that the Council had decided upon holding the annual dinner of the Society some time during the month of May; and that the arrangements, which were in the hands of a sub-committee, would be duly announced to the members.

Dr. COLLINGWOOD stated that he had received from a correspondent in Scotland, a *Doris*, bearing a close resemblance to the *Doris planata* of Messrs. Alder and Hancock, but without its flat planarian form. He had submitted it to Mr. Alder, and he read a letter from that gentleman, who was greatly interested with the specimen, which corroborated his belief that the specimen figured in their work was an immature individual of the *Doris testudinaria* of Risso, of which the English *Doris planata* must henceforth be regarded as a synonym.

Mr. PICTON inquired whether any remarks on the paper, "On a new theory of Steam," read at the previous meeting, would be in order.

The CHAIRMAN replied, that usually no discussion took place on papers previously read; but as so little time had been allowed after the reading of the paper at the last meeting, he would not object.

Mr. PICTON then proceeded:—The paper in question professed to propound a new theory as to the nature and genera-

tion of steam. The new points were stated to be these—that steam and vapour are identical in their nature and laws ; that steam is developed at all temperatures ; that it is not generated, as usually supposed, at the time of its development, but exists in a free state in the substance of the water, varying in pressure with the temperature ; that water in heating does not expand and circulate, as is usually supposed ; that cold water does not condense steam, but absorbs or dissolves it. The first statement, that steam and vapour are identical, is no new discovery at all, but has been recognised from the time of James Watt, who himself investigated the subject, and delegated it to Southern and Creighton, who made a series of experiments on steam at all pressures from 4-10ths of an inch mercurial pressure up to 240 inches. Dr. Dalton, in 1793, published the results of similar experiments. Bétancourt, in France, soon after published tables of pressure at various temperatures, from 32 deg. Fahrenheit, to 279 deg. Arago, Regnault, and various other scientific men have pursued similar enquiries. The following laws, which are true of steam, as of all other gaseous substances, at all temperatures, may be met with in most treatises on steam :—(1) with a constant temperature, the pressure varies simply as the density, or inversely as the volume ; (2) with a constant pressure, expansion is uniform under a uniform accession of heat at the rate of $\frac{1}{273}$ part of the volume for each degree ; (3) with a constant volume or density, the increase of pressure is uniform at the rate of $\frac{1}{273}$ part of the pressure for each degree of temperature acquired. The existence of steam diffused in water in a free state was anything but proved by the experiments submitted. The clouded appearance of the water, as seen by the oxy-hydrogen light, was simply due to the varying density owing to the partial change of temperature. The phenomena of the irregular outburst of the Geysers in Iceland had been explained by Professor Bunsen on

true scientific principles. Water, after being long subjected to heat, loses much of the air contained in it, has the cohesion of its molecules much increased, and requires a higher temperature to cause ebullition; at which moment the production of steam becomes so great and instantaneous as to cause explosion. The introduction of stones or foreign matter, by disturbing the water, materially aids this operation. The water of the Geysers constantly increases in temperature up to the moment of explosion, having been found as high as 261 deg. Fahrenheit, being equal to a steam pressure of two and a half atmospheres, or 36lbs. to the square inch. On the whole, Mr. Williams's theory was by no means proved either by the experiments or the reasoning adduced.

Dr. EDWARDS, in reply to Mr. Picton, recapitulated some of the principal novel points of Mr. Reed's paper, which he considered to be a fair exposition of the views of Mr. C. Wye Williams. He said, that had time and opportunity permitted, he should have been glad to have followed Mr. Picton's criticisms *seriatim*, as he thought they might all be met. But he should better consult his own feelings and their patience by stating, in a very few words, what he considered to be the novel and important point which Mr. Williams' experiments established, viz., that water possesses an extraordinary solvent power in regard to its own vapour. This assertion need not surprise us, for the solvent powers of water upon various substances greatly exceed those of other liquids. In reference to solids, such as salt, sugar, and gum, the examples are very familiar to us; but in reference to gases and vapours, this power is less popularly known, but is not less real and general. Some gases, such as Chlorine, Hydrochloric acid, and Ammonia, are dissolved by water at ordinary temperatures to the extent of from 30 to 40 per cent., but this aëriform matter, although held in solution, is liable to be readily withdrawn, either slowly or suddenly, by mechanical

changes in the liquid. The effect of surcharging a liquid with gaseous matter is seen upon withdrawing the cork from a bottle of champagne or soda-water. The amount of gas dissolved at a given temperature by water varies greatly in different cases, but Mr. Williams leads us to believe, that the greatest solvent power of water is exerted upon its own vapour, and that in an increasing ratio up to a temperature of 212° to 218° Fahrenheit, when, being super-saturated, the phenomenon of ebullition occurs. Mr. Williams combats the idea frequently reiterated in works upon Steam that steam is "annihilated" when condensed in water—and Dr. Edwards had had repeated opportunities in Mr. Williams' laboratory of confirming this view. Experiments of this nature may be "illustrated" in the public lecture-room, but not "*proved*." Gentlemen who were disposed to study the question more closely, would be well repaid by a patient repetition of the experiments detailed in Mr. Williams' book, and he should be very glad to offer members of the Society such facilities as his laboratory would afford for studying the phenomena of steam in water, in greater detail. He was convinced that Mr. Williams had corrected many fallacies, and opened a valuable field of investigation, which would well repay the cultivation of practical and scientific engineers.

The following Paper was then read :—

THE ESSENES.

BY THE REV. CHRISTIAN D. GINSBURG, LL.D.

I.

It is very surprising that the Essenes, whose exemplary virtues elicited the unbounded admiration of even the Greeks and Romans, and whose doctrines and practices contributed so materially to the spread of Christianity, should be so little known among intelligent Christians. The current information upon this remarkable sect or order of Judaism, to be found in ecclesiastical histories and Cyclopædias, is derived from the short notices of Philo, Pliny, Josephus, Solinus, Porphyry, Eusebius, and Epiphanius. These seven witnesses—of whom the first and third are Jewish philosophers, the second, fourth and fifth heathen writers, and the last two Christian church historians—are all who, till within a very recent period, have been subpœnaed before the tribunal of public opinion, to give evidence as to the character of these very much misunderstood and neglected Essenes.

Not only is this combined testimony insufficient, but it is too much tainted with the peculiar dogmas of the respective witnesses, to furnish the general reader with an unbiassed notion of the character and doctrines of this ancient sect. Philo and Josephus, writing in Greek and in apology for their Jewish brethren, were too anxious to represent to the Greeks and Romans every phase and sect of Judaism, as corresponding to the different systems of Greek and Roman philosophy; Pliny, Solinus, and Porphyry, again, betray too great an ignorance of the inward workings of the Jewish religion, and too much prejudice against the Jews; whilst Epiphanius draws upon his imagination, and Eusebius simply copies the account of Philo, with the well-known patristic pen. Nor can the

modern descriptions of the Essenes, as given in the histories of the church and in the popular Cyclopædias, be always relied upon when they profess to give the results of the afore-mentioned garbled scraps of ancient information ; since the writers are either too much afraid of, or too much pleased with, the marked resemblance between some of the doctrines and practices of Christianity and Essenism. Hence those who style themselves the true evangelical Christians are very anxious to destroy every appearance of affinity between Essenism and Christianity, lest it should be said that the one gave rise to the other ; whilst those who are termed Rationalists multiply and magnify every feature of resemblance, in order to show that Christianity is nothing but a development of Essenism—so that the poor Essenes are crucified between the two.

The design of this essay is to give an impartial statement of the doctrines and practices of the Essenes ; to show their rise and progress, their relationship both to Judaism and Christianity, their numbers and localities, to trace the most probable signification of their name, &c., &c. To do this, I not only appeal to the seven stereotyped witnesses, but to the information upon this subject scattered throughout the Midrashim and the Talmud. But not to incur the charge of partiality, as well as to enable you to test my conclusions, I have collected all that the ancients have written upon this subject, and append to this paper the whole account which Philo, Pliny, Josephus, Solinus, Porphyry, Eusebius, and Epiphanius give of the Essenes.

The cardinal doctrines and practices of this sect are as follows :—They regarded the inspired Law of God with the utmost veneration. In fact, their adhesion to it was such that they were led thereby to pay the greatest homage to Moses, the lawgiver, and to visit with capital punishment any one of the brotherhood who blasphemed his name. The

highest aim of their life was to become the temples of the Holy Ghost, when they could prophesy, perform miraculous cures, and, like Elias, be the forerunners of the Messiah. This they regarded as the last stage of perfection, which could only be reached by gradual growth in holiness, brought about through strictly observing the commandments and the Levitical laws of purity contained in the Pentateuch, mortifying the flesh and the lusts thereof, and being meek and lowly in spirit, inasmuch as this would bring them into closer communion with him who is the Holy One of Israel. This earnest desire to avoid everything which involved profanity in the slightest degree and which might interpose between them and the Deity, made them abstain from using oaths, because they regarded the invocation, in swearing, of heaven or the heavenly throne, or anything which represents God's glory, as a desecration. Their communication was yea, yea; nay, nay; whatsoever was more than these came of evil.

Their increased strictness in enforcing the observance of the rigid Mosaic laws of Levitical purity, which were afterwards amplified and rendered still more rigid by traditional explanations,¹ ultimately compelled the Essenes to withdraw

¹ According to tradition there were four degrees of purity. 1. The ordinary purity required of every worshipper in the temple (קדושת המקדש). 2. The higher degree of purity necessary for eating of the heave-offering (קדושת העומר). 3. The still higher degree requisite for partaking of the sacrifices (קדושת הקרבן). And 4. The degree of purity required of those who sprinkle the water absolving from sin (קדושת המטהר). Each degree of purity required a greater separation from the impurities described in Leviticus xi, 24—xv, 28. These impure subjects were termed *the fathers of impurity*; that which was touched by them was designated *the first generation of impurity*; what was touched by this again, was called *the second generation of impurity*; and so on. Now, heave-offerings—the second degree of holiness—became impure when touched by *the third generation*; the flesh of sacrifices—the third degree of holiness—when coming in contact with the fourth generation; and so on. These degrees of purity had even to be separated from each other; because the lower degree was, in respect to the higher one, regarded as impure, and any one who lived according to a higher degree of purity became impure by touching one who lived according to a lower degree, and could only regain his purity by lustrations (טבילה). The first degree was obligatory upon every one, the other grades were voluntary. Before partaking of the heave-offering, the washing of hands was required; and before eating of the flesh of sacrifices, immersion of the whole body was required.—*Comp. Babylonian Talmud, Tract Chagiga, 18 b.*

themselves altogether from the society of their Jewish brethren, to form a separate community, and to live apart from the world, since contact with any one who did not practice these laws, or with anything belonging to such an one, rendered them impure. This fear of coming in contact with that which is impure, as well as the desire not to be hindered in their spiritual communion with their Creator, also made the Essenes abstain from marriage; inasmuch as women, according to the law, are subject to perpetual pollutions in menstruum and child-birth (compare Lev. xii, 1—8; xv, 19—31), and as going to one's wife, even under ordinary circumstances, is regarded as defiling (*vide infra*, p. 215, note 19). There were, however, some weak brethren who could not be like the angels in heaven, neither marrying nor being given in marriage; these were allowed to take wives, but they could never advance to the highest orders of the brotherhood, and had, moreover, to observe laws specially enacted for married brethren and sisters.

Here, in their separation from the Jewish nation, whatever any one of them possessed was deposited in the general treasury, from which the wants of the whole community alike were supplied by stewards appointed by the whole brotherhood; so that they had all things in common. There were no distinctions amongst them, such as rich and poor, masters and servants; they called no one master upon earth, but all ministered to the wants of one another. They lived peaceably with all men, reprobated slavery and war, and would not even manufacture any martial instruments whatever, however great the temptation or the fear might be. They were governed by a president, who was elected by the whole body, and who also acted as the judge of the community. Trials were conducted by juries, composed, not as our juries are, of twelve persons, but of the majority of the community, or of at least a hundred members, who had to be unanimous in their verdict.

The brother who was found guilty of walking disorderly was excommunicated, yet was he not regarded as an enemy, but was admonished as a brother, and received back after due repentance.

As it was contrary to the laws of Levitical purity to buy anything from one who did not practice those laws, the Essenes had to raise the supplies of all their wants among themselves. In this they experienced no difficulty, as their food and raiment were most simple and very self-denying, and as each one of the community willingly took his share of work in the department in which he most excelled. Some were engaged in tilling the ground, some in tending flocks and rearing bees, some in preparing food, some in making the articles of dress, some in healing the sick, and some in instructing the young ; whilst all of them devoted certain hours to studying the mysteries of nature and revelation and of the celestial hierarchy. They always got up before the sun rose, and never talked about any worldly matters till they had all assembled together and, with their faces turned towards the sun, offered up their national hymn of praise (המאיר לארץ) for the renewal of the light of the day. This done, every one betook himself to his work, according to the directions of the overseers, and remained at it till the fifth hour (or eleven o'clock, a.m.), when the labour of the forenoon regularly terminated. All of them again assembled together, had a baptism in cold water, put on their white garments, the symbol of purity, and then made their way to the refectory, which they entered with as much solemnity as if it were the temple. The meal was a common one ; and each member took his seat according to the order of age. Those of the brethren who were the bakers and cooks then placed before each one a little loaf of bread and a dish of the most simple food, consisting chiefly of vegetables as they ate very little animal flesh, and the repast commenced after the priest had invoked God's

blessing upon it. A mysterious silence was observed during the meal, which had the character of a sacrament, and may have been designed as a substitute for the sacrifices which they refused to offer in the temple. The priest concluded it by offering thanks to the Bountiful Supplier of all our wants, which was the signal of dismissal. Hereupon all withdrew, put off their white and sacred garments, and dressed themselves in their working clothes, resumed their several employments which they had to do according to the directions of the overseers till the evening, when they assembled again to partake of a common meal. But though every thing was done under the directions of the overseers, and the Essenes had even to receive their presents through the stewards, yet in two things they were at perfect liberty to act as they pleased, viz., they could relieve the distressed with as much money as they thought proper, and manifest their compassion for those who were not of the brotherhood as much as they liked, and whenever they liked. Such was their manner of life during the week days.

The Sabbath they observed with the utmost rigour, and regarded even the removal of a vessel as labour, and a desecration of this holy day. On this day they took special care not to be guilty of forsaking the assembling of themselves together, as the manner of some is. Ten persons constituted a complete and legal number for divine worship in the synagogue, and in the presence of such an assembly an Essene would never spit, nor would he at any time spit to his right hand. In the synagogue, as at meals, each one took his seat according to age, in becoming attire. They had no ordained ministers, whose exclusive right it was to conduct the service; any one that liked took up the Bible and read it, whilst another, who had much experience in spiritual matters, expounded what was read. The distinctive ordinances of the brotherhood, as well as the mysteries connected with the Tetragrammaton

and the angelic worlds were the prominent topics of Sabbatic instruction. Every investigation into the causes of the phenomena both of mind and matter was strictly forbidden, because the study of logic and metaphysics was regarded as injurious to a devotional life.

Celibacy being the rule of Essenism, the ranks of the brotherhood had to be filled up by recruits from the Jewish community at large. They preferred taking children, whom they educated most carefully and taught the practices of the order, believing that of such the kingdom of heaven is best made up. Every grown-up candidate (ὁ ζηλωτής) had to pass through a noviciate of two stages, which extended over three years, before he could be finally admitted into the order. Upon entering the first stage, which lasted twelve months, the novice (νεοσύστατος) had to cast all his possessions into the common treasury. He then received a copy of the regulations of the brotherhood (δίαίταν τοῦ τάγματος), as well as a *spade* (σκαλὶς ἀξινάριον=תל''), to bury the excrement, (comp. Deut. xxiii, 12—14,) an *apron* (περίξωμα=ת''), used at the lustrations, and a *white robe* (λευκὴν ἐσθῆτα=לב לב) to put on at meals, being the symbols of purity. During the whole of this period he was an outsider, and was not admitted to the common meals, yet he had to observe some of the ascetic rules of the Society. If, at the close of this stage, the community found that he had properly acquitted himself during the probationary year, the novice was admitted into the second stage, which lasted two years, and was called an *approacher* (προσίων ἔγγιον). During the period which lasted two years he was admitted to a closer fellowship with the brotherhood, and shared in their lustral rites (καθαρώτερον πρὸς τῶν ἀγνείαν ὑδάτων μεταλαμβάνει), but was still not admitted to the common meals (εἰς τὰς συμβιώσεις), nor to any office. If he passed satisfactorily through the second stage of probation, the *approacher* became an *associate*, or a full member of the society (ὁμολητής,

ἐς εἰς τὸν δῆλον ἐμπόρεον=לֶחֶם, when he was received into the brotherhood and partook of the common meal (ἐμπόρεος).

Before, however, he was made a *housiletes*, or finally admitted into their fellowship, he had to bind himself by a most solemn oath this being the only occasion on which the Essenes used an oath to observe three things. 1. *Love to God.* 2. *Merciful justice towards all men*; especially to honor nobody as master, to avoid the wicked, to help the righteous, to be faithful to every man, and especially to rulers (τοῖς ἀρχαῖς), for without God no one comes to be ruler. And 3. *Purity of character*, which implied humility, love of truth, hatred of falsehood, strict secrecy towards outsiders, so as not to divulge the secret doctrines (μυστήρια) to any one, and perfect openness with the members of the order, and, finally, carefully to preserve the books belonging to their sect (τὰ τῆς αἰρέσεως αὐτῶν βιβλία), and the names of the angels (τὰ τῶν ἐγγύλων ὀνόματα) or the mysteries connected with the *Tetragrammaton* (יהוהוהוה) and the other names of God and the angels, comprised in the theosophy (הקדמות) as well as with the cosmogony (בריאת העולם) which also played so important a part among the Jewish mystics and the Kabbalists.

The three sections consisting of candidate (ὁ ζῆλων), approacher (πρόσων ἔγγιον), and associate (ἐμπόρεος, ἔς εἰς τὸν δῆλον ἐμπόρεον), were subdivided into four orders, distinguished from each other by superior holiness. So marked and serious were these distinctions, that if one belonging to a higher degree of purity touched one who belonged to a lower order, i.e., if one of the fourth or highest order came in contact with one of the third or lower order, or if one of the third touched one of the second order, or if one of the second order touched one of the first or lowest order, he immediately became impure, and could only regain his purity by lustrations. From the beginning of the noviciate to the achievement of the

highest spiritual state, there were *eight* different stages which marked the gradual growth in holiness. Thus, after being accepted as a novice and obtaining *the apron* (זרין—*repizuma*) the symbol of purity, he attained (1) to the state of *outward* or *bodily* purity by baptisms (זריזות מביאה לידי נקיות). From this state of bodily purity he progressed (2) to that stage which imposed abstinence from connubial intercourse (נקיות מביאה לידי פרישות), or to that degree of holiness, which enabled him to practise celibacy. Having succeeded in mortifying the flesh in this respect, he advanced (3) to the stage of *inward* or *spiritual* purity (פרישות מביאה לידי טהרה). From this stage again he advanced (4) to that which required the banishing of all anger and malice, and the cultivation of a meek and lowly spirit (טהרה מביאה לידי ענוה). This led him (5) to the culminating point of holiness (ענוה מביאה לידי חסידות). Upon this summit of holiness he became (6) the temple of the Holy Spirit, and could prophesy (חסידות מביאה לידי חסידות). Thence again he advanced (7) to that stage in which he was enabled to perform miraculous cures, and raise the dead (רוח הקדש לידי תחיה"מ). And finally, he attained (8) to the position of Elias the forerunner of the Messiah (תחיה"מ לידי אליהו).

The earnestness and determination of these Essenes to advance to the highest state of holiness were seen in their self-denying and godly life; and it may fairly be questioned whether any religious system has ever produced such a community of saints. Their absolute confidence in God and resignation to the dealings of Providence; their uniformly holy and unselfish life; their unbounded love of virtue, and utter contempt for worldly fame, riches or pleasure; their industry, temperance, modesty and simplicity of life; their contentment of mind and cheerfulness of temper; their love of order, and abhorrence of even the semblance of falsehood; their benevolence and philanthropy; their love for the brethren,

and their following peace with all men ; their hatred of slavery and war ; their tender regard for children, and reverence and anxious care for the aged ; their attendance on the sick, and readiness to relieve the distressed ; their humility and magnanimity ; their firmness of character and power to subdue their passions ; their heroic endurance under the most agonizing sufferings for righteousness' sake ; and their cheerfully looking forward to death, as releasing their immortal souls from the bonds of the body to be for ever in a state of bliss with their Creator—have hardly found a parallel in the history of mankind. No wonder that Jews, of different sects, Greeks and Romans, Christian church historians, and heathen writers have been alike constrained to lavish the most unqualified praise on this holy brotherhood. It seems that the Saviour of the world, who illustrated simplicity and innocence of character by the little child which he took up in his arms, also showed what is required for a holy life in the Sermon on the Mount by a description of the Essenes. So remarkably does this brotherhood exemplify the lessons which Christ propounds in Matth. chap v., &c.

This leads us to consider the question about the origin of this brotherhood, and their relationship to Judaism and Christianity. The assertion of Josephus that they "live the same kind of life which among the Greeks has been ordered by Pythagoras" (vide infra, p. 226, § 4,) has led some writers to believe that Essenism is the offspring of Pythagorism. The most able champion for this view is Zeller, the author of the celebrated *History of Philosophy*. He maintains² "that Essenism, at least as we know it from Philo and Josephus, has, in its essence, originated under Greek and especially under Pythagorean influences," and tries to support his conclusion by the following summary of the supposed resemblances between Neo-Pythagorism and Essenism. (1)

▷ attain to superior holiness by an ascetic life.

²Philosophie, vol. iii, part ii, p. 583 ff.

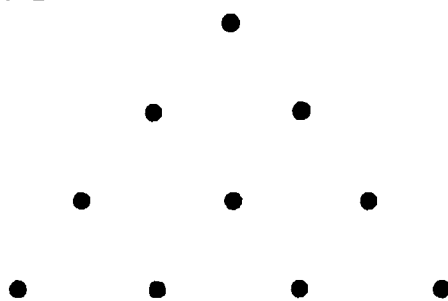
(2) Both repudiate animal sacrifices, the eating of animal food, wine and marriage. (3) Both of them are, however, not quite agreed among themselves about the latter point; for on both sides there are some who recommend marriage, but restrict connubial intercourse to procreation. (4) Moreover, both demand simplicity of life. (5) Both refrain from warm baths. (6) Both wear white garments, especially at dinner time. (7) Both lay the greatest value upon their purification and eschew everything unclean. (8) Both prohibit oaths, because a pious man does not require them. (9) Both find their social ideal in institutions which it is true were only realized by the Essenes, and in living together with perfect community of goods and unconditional subordination of individuals to their overseers. (10) Both insist on strict secrecy about their schools. (11) Both like symbolic representations of their doctrines. (12) Both support themselves on an allegorical interpretation of ancient traditions, whose authority they recognise. (13) Both worship higher powers in the elements, and pray to the rising sun. (14) Both seek to keep everything unclean from their sight, and for this reason have peculiar prescriptions about the discharge of the duties of nature. (15) Both cultivate the belief in intermediate beings between the supreme Deity and the world. (16) Both devote themselves to magic arts. (17) Both regard above all things the gift of prophecy as the highest fruit of wisdom and piety, and both boast to possess this gift in their most distinguished members. (18) Finally, Both corroborate their peculiar mode of life with a dualistic view of the relation of the spirit and matter, good and evil. (19) Both agree especially in their notions about the origin of the soul, its relationship to the body, and about a future life, only the doctrine of transmigration of souls seems not to have been known among the Essenes."³

³ The figures before each point of comparison do not exist in the original German; I have inserted them in the translation in order to facilitate the references to these different points of comparison.

Striking as these resemblances may appear, it will be seen on a closer examination that some of the points which constitute this comparison do not exist in Essenism, that others are either due to the coloring of Josephus or have their origin in Judaism, that the difference between Pythagorism and Essenism are far more numerous and vital than the parallels, and that Zeller's conclusion is therefore not warranted. I shall examine these points seriatim.

(1) Asceticism is not foreign to Judaism. We meet with individuals who voluntarily imposed upon themselves ascetic life to be able, as they thought, to give themselves more entirely to the service of God by mortifying the lusts of the flesh, at a very early period of Biblical history; and we need only to refer to the regulations about Nazarites (Numb. vi. 1-21), to the case of Manoah and his wife (Judg. xiii.), to the life of Elijah (1 Kings xviii.-xix.) to the practices of the Rechabites throughout the Scriptures, of persons abstaining from the good things of this world, to see how the Essenes, without (Jer. xxxv. 2, &c.), and to the numerous instances which occur copying the Pythagoreans or any other heathen fraternity, would naturally conclude that asceticism is conducive to a devotional life. (2) As to the repudiation of animal sacrifice, animal food, wine, &c., to which Zeller refers in the second point of comparison, I submit that the Essenes *did not repudiate* animal sacrifices, but that they *could not* offer them on account of the different view which they had about holiness, as Josephus most distinctly declares (*vide infra* p. 228), that neither Philo nor Josephus says a word about their objecting to eat animal flesh or drink wine, and that their celibacy arose from an extension of a law contained in the Pentateuch. Besides, it is not quite so certain that the Pythagoreans did not offer animal sacrifices; Diogenes Laertius and others positively state that Pythagoras himself offered a hecatomb upon his discovering what is called the

Pythagoric theorem, *i.e.* that, in a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the sides.⁴ (4) The fourth comparison about simplicity of life is involved in the first. (5) The statement in the fifth comparison, that the Essenes refrain from warm baths, is purely imaginary; (6, 7) whilst the white garments and the purifications mentioned in the sixth and seventh parallels are strictly Jewish and Biblical. As symbolic of purity the priests were required to clothe themselves in white linen (Exod. xxviii. 39-42; Levit. vi. 10; xvi. 4), and the saints in heaven, washed and cleansed from all impurity, are to be clad in white garments (4 Esdras ii. 39-45; Enoch lxi. 18; Rev. iii. 4; vi. 11; vii. 9, 14; xix. 8); soiled garments are regarded as emblematic of impurity (Zech. iii. 3, &c.) Inseparably connected therewith are the frequent purifications or washings enjoined on the priests before entering into the presence of God to perform religious acts (Levit. xvi. 4; 2 Chron. xxx. 19), and on the people generally after coming in contact with anything impure (Levit. xi. 25, 40; xv. 5-24). The white garments and the frequent purifications of the Essenes, who strove to live after the highest degree of Levitical purity, were therefore in perfect harmony with exaggerated Judaism. (8) As to the assertion in comparison 8 that the Pythagoreans prohibited oaths, it is well known that they did use oaths on important occasions, and that they held it to be most sacred to swear by the number four, which they represented by ten dots in the form of a triangle, so that each side consisted of four dots, as follows:—



⁴ Comp. Diog. Laert. de Vitis Philosophorum, lib. viii. Vit. Pythagor. xii. It is true that Cicero represents Cotta as giving no credit to this story, because, as

The community of goods, the secrecy about their institutions, the symbolic representation of their doctrines, &c., mentioned in comparisons 9, 10, 11, 12, are the natural result of their manner of life. (13) That they worshipped the sun is not borne out by fact, (14) whilst their peculiar manner in performing the functions of nature is in accordance with the injunction of Scripture (Deut. xxiii. 13, 15), which the Essenes, as the spiritual host of the Lord, applied to themselves. (15) As to their very peculiar belief in intermediate beings between the Deity and the world, mentioned in the fifteenth point of comparison, I can only say that Philo and Josephus say nothing about it. (16) Their devotedness to the study of the magic arts was restricted to miraculous cures, and was not peculiar to them; since tradition had made Solomon the author of books on magical cures and exorcisms, and Josephus tells us (*vide infra*, p. 220, note 35) that he had seen other Jews performing these magic cures. (17) Neither is there anything foreign in the opinion, that the power to foretell future events can only be obtained by leading a life of preeminent holiness, for this was the common belief of the Jews, though it is true that the Essenes were the only section of the Jewish community who as a body strove to obtain the gift of prophecy. It, however, must not be forgotten that others too laid claim to this gift. Josephus tells us that when brought as prisoner of war before Vespasian, he addressed the Roman general as follows:—"Thou, Vespasian thinkest that thou hast simply a prisoner of war in me, but I appear before thee as a prophet of important future events. If I had not to deliver to thee a message from God, I would have known what the Jewish law demands, and how a general ought to die. Dost thou want to send me to Nero? For what? Will his successors, who ascend the throne before thee, reign

Pythagoras never offered animal sacrifices (*De Natura Deorum*, i.), but it is also related by Athenæus (*Deipnosoph. lib. x.*),
 73.

long on it? No! thou, Vespasian, wilt be emperor and autocrat—thou, and this thy son.” (*Jewish War*, iii. 8, § 9). This prophecy of Josephus is also recorded by the celebrated Roman historian Dion Cassius who says: “Josephus, a Jew, was taken prisoner by him (i.e. Vespasian), and put in chains; but he smilingly addressed him: ‘Thou puttest me now in chains, but thou wilt loose them again, after twelve months, as emperor,’” (*lib.* lxvi. c. 1); and by Tacitus (*lib.* v. c. 13). What Zeller says in comparisons 18 and 19 about their dualistic view of the relationship of spirit and matter, good and evil, and their notions of the origin of the soul, is entirely owing to Josephus’ colouring of the subject, as may be seen from the notes on the extracts from this historian in the second part of this Essay.

Having thus shown that the parallels between Pythagorism and Essenism are more imaginary than real, and that the few things which might be considered as being analagous are unimportant, and are such as will naturally develop themselves among any number of enlightened men who devote themselves almost exclusively to a contemplative religious life, I shall now point out some of the vital differences between the two brotherhoods. 1. The Pythagoreans were essentially polytheists; the Essenes were real monotheistic Jews, worshippers of the Holy One of Israel. 2. The Pythagoreans clustered round Pythagoras as the centre of their spiritual and intellectual life, and estimated the degree of perfection of any of the members by the degree of intimacy which he enjoyed with Pythagoras: the Essenes regarded the inspired Scriptures as their sole source of spiritual life, and called no man master on earth, every one having the same right to teach, and being alike eligible for all the offices in the commonwealth. 3. The Pythagoreans favored matrimony, and we are told that Pythagoras himself had a wife and children; whilst celibacy was the rule of

Essenism, marriage being the exception. 4. The Pythagoreans believed in the doctrine of metempsychosis, which led them to abstain from eating animal flesh, because human souls migrated into animals, and made Pythagoras once intercede in behalf of a dog that was being beaten, because he recognised in its cries the voice of a departed friend: the Essenes believed no such thing. 5. Scientific studies, such as mathematics, astronomy, music, &c., formed an essential part of the Pythagorean system: Essenism strictly forbade these studies as injurious to a devotional life. 6. Pythagorism was occupied with investigating the problems of the origin and constitution of the universe: Essenism regarded such inquiries as impious, and most implicitly looked upon God as the creator of all things. 7. Pythagorism taught that man can control his fortune and overrule his circumstances: Essenism maintained that fate governs all things, and that nothing can befall man contrary to its determination and will. 8. Pythagorism enjoined ointment to be used by its followers: the Essenes regarded it as defilement. 9. The Pythagoreans had a sovereign contempt for all those who did not belong to their ranks: the Essenes were most exemplary in their charity towards all men, and in their unbounded kindness to those who were not of the brotherhood. 10. The Pythagoreans were an aristocratical and exclusive club, and excited the jealousy and hatred not only of the democratical party in Crotona, but also of a considerable number of the opposite faction, so much so that it speedily led to their destruction: the Essenes were meek and lowly in spirit, and were so much beloved by those who belonged to different sects, that Pharisees and Sadducees, Greeks and Romans, Jews and Gentiles, joined in lavishing the highest praise upon them.⁵

⁵ An excellent account of the Pythagorean system is given by Zeller, *Geschichte der Philosophie*. Erster Theil, Tübingen, 1856, pp. 206–365; Grote, *History of Greece*. vol. iv. London, 1857, pp. 527–553; and Mason, in *Smith's Dictionary Roman Biography and Mythology*, Article PYTHAGORAS.

As to the relationship which Essenism sustains to Judaism, the very fact that the Essenes, like the other Jews, professed to be guided by the teachings of the Bible, and that a rupture between them and the Jewish community at large is nowhere mentioned, but that on the contrary they are always spoken of in the highest terms of commendation, would of itself be sufficient to prove it. In doctrine, as well as in practice, the Essenes and the Pharisees were nearly alike. Both had four classes of Levitical purity, which were so marked that one who lived according to the higher degree of purity, became impure by touching one who practised a lower degree, and could only regain his purity by lustration. Both subjected every applicant for membership to a noviciate of twelve months. Both gave their novices an apron in the first year of their probation. Both refused to propound the mysteries of the cosmogony and cosmology to any one except to members of the society. Both had stewards in every place where they resided to supply the needy strangers of their order with articles of clothing and food. Both regarded office as coming from God. Both looked upon their meal as a sacrament. Both bathed before sitting down to the meal. Both wore a symbolic garment on the lower part of the body whilst bathing. Amongst both the priest began and concluded the meal with prayer. Both regarded ten persons as constituting a complete number for divine worship, and held the assembly of such a number as sacred. Amongst both of them none would spit to the right hand in the presence of such an assembly. Both washed after performing the functions of nature. Both would not remove a vessel on the Sabbath. And both abstained from using oaths, though it is true that the Essenes alone uniformly observed it as a sacred principle. The differences between the Essenes and the Pharisees are such as would naturally develop themselves in the course of time from the extreme rigour with which the former sought to practise the Levitical laws of

purity. As contact with any one or with anything belonging to any one who did not live according to the same degree of purity, rendered them impure according to the strict application of their laws, the Essenes were in the first place obliged to withdraw from intercourse with their other Jewish brethren, and form themselves into a separate brotherhood. Accordingly the first difference between them and the others was that they formed an isolated order. The second point of difference was on marriage. The Pharisees regarded marriage as a most sacred institution, and laid it down as a rule that every man is to take a wife at the age of eighteen (Comp. Aboth v. 21), whilst the Essenes were celibates, which, as we have seen before, also arose from their anxiety to avoid defilement. Hence the declaration in Aboth d. R. Nathan—" *there are eight kinds of Pharisees; . . . and those Pharisees who live in celibacy are Essenes*" (c. xxxvii.).⁶ The third difference which existed between them and the Pharisees, and which was also owing to the rigorous application of the Levitical laws of purity, was that they did not frequent the temple and would not offer sacrifices. And fourthly, though they firmly believed in the immortality of the soul, yet, unlike the Pharisees, they did not believe in the resurrection of the body.

The identity of many of the precepts and practices of

⁶ R. Nathan, the Babylonian as he is called, was Vice-President of the College in Palestine, under the Presidency of Simon III. b. Gamaliel II. A.D. 140. The above-quoted work of which he is the reputed author, as indicated by its title, *אבות דרבי נתן* i.e. *the Aboth of R. Nathan*, is a compilation of the apothegms and moral sayings of the Jewish fathers (*אבות*), interspersed with traditional explanations of divers texts of Scripture, consisting of forty-one chapters. Both the historian and moral philosopher will find this work an important contribution to the literary and philosophical history of antiquity. It is printed in the different editions of the Talmud, and has also been published separately with various commentaries, in Venice, 1622: Amsterdam, 1778, &c., &c.; and a Latin translation of it was published by our learned countryman, Francis Taylor, under the title of *R. Nathanis Tractatus de Patribus, latine cum Notis*. London, 1654, 4to. Comp. Zunz, *Die gottesdienstlichen Vorträge der Juden*. Berlin, 1832, p.p. 108, 109; Fürst, *Kultur-und Literaturgeschichte der Juden in Asien*. Leipzig, 1849, p. 16 ff; by the same author, *Bibliotheca Judaica* iii. Leipzig, 1868, p. 19 ff; Steinschneider, *Catalogus Libr. Bodleiana* col. 2,032 ff.

Essenism and Christianity is unquestionable. Essenism urged on its disciples to seek first the kingdom of God and his righteousness : so Christ (Matt. vi. 33 ; Luke xii. 31). The Essenes forbade the laying up of treasures upon earth : so Christ (Matt. vi. 19-21). The Essenes demanded of those who wished to join them to sell all their possessions, and to divide it among the poor brethren : so Christ (Matt. xix. 21 ; Luke xii. 33). The Essenes had all things in common, and appointed one of the brethren as steward to manage the common bag ; so the primitive Christians (Acts ii. 44, 45 ; iv. 32-34 ; John xii. 6 ; xiii. 29). Essenism put all its members on the same level, forbidding the exercise of authority of one over the other, and enjoining mutual service ; so Christ (Matt. xx. 25-28 ; Mark ix. 35-37 ; x. 42-45). Essenism commanded its disciples to call no man master upon the earth ; so Christ (Matt. xxiii. 8-10). Essenism laid the greatest stress on being meek and lowly in spirit ; so Christ (Matt. v. 5 ; xi. 29). Christ commended the poor in spirit, those who hunger and thirst after righteousness, the merciful, the pure in heart, and the peacemakers ; so the Essenes. Christ combined the healing of the body with that of the soul ; so the Essenes. Like the Essenes, Christ declared that the power to cast out evil spirits, to perform miraculous cures, &c., should be possessed by his disciples as signs of their belief (Mark xvi. 17 ; comp. also Matt. x. 8 ; Luke ix. 1, 2 ; x. 9). Like the Essenes, Christ commanded his disciples not to swear at all, but to say yea, yea, and nay, nay. The manner in which Christ directed his disciples to go on their journey (Matt. x. 9, 10) is the same which the Essenes adopted when they started on a mission of mercy. The Essenes, though repudiating offensive war, yet took weapons with them when they went on a perilous journey ; Christ enjoined his disciples to do the same thing (Luke xxii. 36). Christ commended that elevated spiritual life, which enables

a man to abstain from marriage for the kingdom of heaven's sake, and which cannot be attained by all men save those to whom it is given (Matt. xix. 10-12 ; comp. also 1 Cor. viii.) ; so the Essenes who, as a body, in waiting for the kingdom of heaven (מלכות השמים) abstained from connubial intercourse. The Essenes did not offer animal sacrifices, but strove to present their bodies a living sacrifice, holy and acceptable unto God, which they regarded as a reasonable service ; the Apostle Paul exhorts the Romans to do the same. (Rom. xii. 1). It was the great aim of the Essenes to live such a life of purity and holiness as to be the temples of the Holy Spirit, and to be able to prophesy : the apostle Paul urges the Corinthians to covet to prophesy (1 Cor. xiv. 1, 39). When Christ pronounced John *to be Elias* (Matt. xi. 14), he declared that the Baptist had already attained to that spirit and power which the Essenes strove to obtain in their highest stage of purity.⁷ It will therefore hardly be doubted that our Saviour himself belonged to this holy brotherhood. This will especially be apparent when we remember that the whole Jewish community, at the advent of Christ, was divided into three parties, the Pharisees, the Sadducees and the Essenes, and that every Jew had to belong to one of these sects. Jesus who, in all things, conformed to the Jewish law, and who was holy, harmless, undefiled, and separate from sinners, would therefore naturally associate himself with that order of Judaism which was most congenial to his holy nature. Moreover, the fact that Christ, with the exception of once, was not heard of in society till his thirtieth year, implying that he lived in seclusion with this fraternity, and that though he frequently rebuked the Scribes, Pharisees and Sadducees, he never denounced the Essenes, strongly confirms this conclusion. There can be no difficulty in admitting that the

⁷ For the passages embodying the sentiments of the Essenes, which constitute the comparisons, we must refer to the second part of this Essay and the

Saviour of the world, who taught us lessons from the sparrows in the air, and the lilies in the field, and who made the whole realm of nature tributary to his teachings, would commend divine truth wherever it existed. But whilst Christ propounded some of the everlasting truths which were to be found less adulterated and practised more conscientiously among the Essenes than among the rest of the people, he repudiated their extremes. They were ascetics; he ate and drank the good things of God (Matt, xi. 19). They considered themselves defiled by contact with any one who practised a lower degree of holiness than their own; Christ associated with publicans and sinners, to teach them the way to heaven. They sacrificed the lusts of their flesh to gain spiritual happiness for themselves; Christ sacrificed himself for the salvation of others.

It is now impossible to ascertain the precise date when this order of Judaism first developed itself. According to Philo, Moses himself instituted this order; Josephus contents himself with saying that they existed "ever since the ancient time of the fathers;" whilst Pliny assures us that, without any one being born among them, the Essenes, incredible to relate, have prolonged their existence for *thousands of ages*.⁸ Bating, however, these assertions, which are quite in harmony with the well known ancient custom of ascribing some pre-Adamite period to every religious or philosophical system, it must already have become apparent, from the description of it, that the very nature of the Essenes precludes the possibility of tracing its date. The fact that the Essenes developed themselves gradually, and at first imperceptibly, through intensifying the prevalent religious notions, renders it impossible to say with exactness at what degree of intensity they are to be considered as detached from the general body.

⁸ Compare the account of Philo, p. 212; Pliny, p. 216; Josephus, p. 228; in the second part of this Essay.

The first mention we have of their existence is in the days of Jonathan the Maccabæan, B.C. 166. (*Joseph. Antiq. xiii. 5, 8*). We then hear of them again in the reign of Aristobulus I., B.C. 106, in connection with a prophecy about the death of Antigonus, uttered by Judas an Essene, of which Josephus gives the following account. "Judas, an Essene, whose predictions had up to this time never deceived, caused great astonishment on this occasion. When he saw at that time Antigonus pass through the temple, he called out to his disciples, of whom he had no small number—'Oh! it would be better for me to die now, since truth died before me, and one of my prophecies has proved false. Antigonus, who ought to have died this day, is alive; Strato's Tower, which is six hundred furlongs distance from here, is fixed for his murder, and it is already the fourth hour of the day [ten o'clock]; time condemns the prophecy as a falsehood.' Having uttered these words, the aged man sunk into a long, dejected, and sorrowing silence. Soon after, the report came that Antigonus was murdered in the subterranean passage which, like Cesarea on the sea side, was also called Strato's Tower. It was this circumstance that misled the prophet." (*Jewish War*, i. 3, § 5; *Antiq. xiii. 11, § 2*). The third mention of their existence we find in the well known prophecy of the Essene Manahem, uttered to Herod when a boy.⁹ Now these accounts most unquestionably show that the Essenes existed at least two centuries before the Christian era, and that they at first lived amongst the Jewish community at large. Their residence at Jerusalem is also evident from the fact that there was a gate named after them ('Εσσηνῶν πύλη *Joseph. Jewish War*, v. 4, § 2). When they ultimately withdrew themselves from the rest of the Jewish nation, the majority of them settled on the north-west shore of the Dead Sea, sufficiently distant to escape its noxious exhalations, and the rest lived in scattered com-

⁹ The prophecy is given in full in the second part of this Essay, p. 226.

munities throughout Palestine and Syria. Both Philo and Josephus estimated them to be above four thousand in number. This must have been exclusive of women and children. We hear very little of them after this period (i.e. 40 A.D.); and there can hardly be any doubt that, owing to the great similarity which existed between their precepts and practices and those of the primitive Christians, the Essenes as a body must have embraced Christianity.

Having ascertained the character of the Essenes, we shall be better prepared to investigate the origin of their name, which has been the cause of so much controversy, and which was not known even to Philo and Josephus. There is hardly an expression the etymology of which has called forth such a diversity of opinion as this name has elicited. The Greek and the Hebrew, the Syriac and the Chaldee, names of persons and names of places, have successively been tortured to confess the secret connected with this appellation, and there are no less, if not more, than *twenty different* explanations of it, which I shall give in chronological order. Philo tells us that some derived it from the Greek homonym *δαίμων* *holiness*, because the Essenes were above all others worshippers of God; but he rejects it as incorrect (*vide infra*, p. 208) without giving us another derivation. 2. Josephus does not expressly give any derivation of it, but simply says, "the third sect who really seem to practise holiness (*ὁ δὲ καὶ δοκεῖ σεμνότερα ἀσκεῖν*) are called Essenes." (*Vide infra* p. 217). From the addition, however, "who really seem to practise holiness or piety," Frankel¹⁰ argues that the word must mean *holiness* or *piety*, because it appears to justify the name, and hence concludes that Josephus most probably took it to be the Hebrew *חסידים* or *צנועים*. Whilst Jost¹¹ is of opinion that Josephus derived it from the Chaldee *ܢܘܬܐ* *to be silent, to be mysterious*,

¹⁰ Zeitschrift für die religiösen Interessen des Judenthums. Berlin, 1856, p. 440.

¹¹ Geschichte des Judenthums und seiner Secten, vol. 1. Leipzig, 1857, p. 207.

because **לשון** *the high priest's breast-plate*, for which the Septuagint has *λογεῖον* or *λόγιον* is translated by him *ἰσσην*, or that he might have deduced this idea from **לשון** itself, and traced it to *λογεῖον* or *λόγιον* as *endowed with the gift of prophecy*.¹² In Aboth of R. Nathan¹³ it is written **לשון** from **לשון** *to do, to perform*, and accordingly denotes *the performers of the law*. 4. Epiphanius again calls them *Ὀσσαῖοι* and *Ὀσσηνοὶ* and tells us that it etymologically signifies *στυβαρὸν γένος the stout or strong race*, evidently taking it for **לשון** or **לשון**. 5. In another place Epiphanius affirms that the Essenes borrowed their name from *Jesse* the father of David, or from *Jesus*, whose doctrines he ascribes to them; explaining the name *Jesus* to signify in Hebrew *a physician*; and calls them *Jesseans*.¹⁴ In this he is followed by Petitus who makes them so related to David that they were obliged to take the name of his father *Jesus* or *Jesse*; ¹⁵ although *Jesus* does not signify physician but *God-help*. 6. Suidas (*Lex s. v.*) and Hilgenfeld (*Die jüdische Apokal. p. 278*), make it out to be the form **לשון** = *σημειωτικοὶ seers*, and the latter maintains that this name was given to them because they pretended to see visions and to prophesy. 7. Josippon b. Gorion¹⁶ (*lib. iv. sects. 6, 7, p.p. 274 and 278, ed. Breithaupt*), and

12 As Mr. Westcott, the writer of the article *ESSENES* in *Smith's Dictionary of the Bible*, has misunderstood this passage and wrongly represented Jost himself as deriving this name from **לשון** *the silent, the mysterious*, we give Jost's own words:—"Uns will scheinen, dass Josephus den Namen allerdings von **לשון** *schweigen, geheimnissvoll sein*, ableitet; dahin führt seine Uebertragung des Wortes **לשון** in die griechischen Buchstaben *ἰσσην* Ed. Hav. Ant. 1, 147, welches Wort die LXX *λογεῖον* übersetzen. Da das Wort **לשון** seinen Zeitgenossen sehr geläufig war, so konnte er annehmen, dass man sich unter dem Namen der Sekte einen angemessenen Begriff dachte und er keiner Erläuterung bedürfe. Ja, es wäre möglich, dass er den Begriff aus **לשון** selbst ableitet, und auf *λογεῖον* oder *λόγιον*, als mit Weissagung begabte, zurückführte. Vergleiche Gfrörer, Philo 1, 196."

13 Aboth di. R. Nathan, cap. xxxvi.

14 Comp. Epiphan. Haeres. xix. lib. i. tom. ii. sect. 4, p. 120, ed. Petav.

15 Comp. Petite Variae Lectiones, c. xxviii. p. 2600.

16 Josippon b. Gorion also called *Gorionides*, lived in Italy about the middle of the tenth century. He is the compiler of the celebrated Hebrew Chronicle called *Josippon*, or the Hebrew Josephus. His real character and the value of his Chronicle are discussed under the article *JOSIPPON* in *Dr. Alexander's edition of Kitto's Cyclopædia of Biblical Literature*.

Gale (*Court of the Gentiles*, part ii., p. 147), take it for the Hebrew **דִּיִּם** *the pious, the puritans*. 8. De Rossi¹⁷ (*Meor Enaim*, 32 a), Gfrörer (Philo, ii. p. 841), Herzfeld (*Geschichte d. V. Israel* ii. p. 397), and others, insist that it is the Aramaic **נִדְנָ** = *δραπευτής* *physician*, and that this name was given to them because of the spiritual or physical cures they performed. Indeed, De Rossi and Herzfeld will have it that the sect *Baithusians* **בֵּיתֻסִּים** mentioned in the Talmud is nothing but a contraction of **בֵּית אִסִּי** *the school or sect of physicians*, just as **בֵּית הִילֵּל** stands for *the school of Hillel*. 9. Salmasius affirms that the Essenes derived their name from the town called *Essa*, situated beyond the Jordan, which is mentioned by Josephus (*Antiq.* xiii. 15, § 2), or from the place *Vadi Osis*.¹⁸ 10. Rappaport (*Erech Milln*, p. 41), says that it is the Greek *κοος* *an associate, a fellow of the fraternity*. 11. Frankel (*Zeitschrift*, 1846, p. 449, &c.), and others think that it is the Hebrew expression **צְנוּעִים** *the retired*. 12. Ewald (*Geschichte d. Volkes Israel*, iv. p. 420), is sure that it is the Rabbinic **עֲבָדִים** *servant (of God)*, and that the name was given to them because it was their only desire to be *δραπευταὶ θεοῦ*. 13. Graetz (*Geschichte der Juden* iii. p. 468, second ed.) will have it that it is from the Aramaic **סְחָא** *to bathe*, with Aleph prostheticum, and that it is the shorter form for **אִסְחָאִי צְפֹרָא** = **טוֹבְלֵי שְׁחָרִית** *ἡμεροβαπτισταὶ hemerobaptists*; the Greek form *Ἐσσαῖος, Ἐσσαῖοι* being nothing but *Assaï* or *Essaï* with **א** elided. 14. Dr. Löw (*Ben Chananja* vol. i. p. 352) never doubts but that they were called *Essenes* after their founder, whose name he tells us was **יֵשִׁי**, the disciple of Rabbi Joshua ben Perachja. 15. Dr. Adler (*Volkslehrer*, vi. p. 50), again submits that it is from the

17 De Rossi, also called *Asarja min Ha-Adomin*, was born at Mantua in 1513, and died 1577. For an account of this eminent Jewish scholar, who may be regarded as the father of Biblical criticism at the time of the Reformation, see *Dr. Alexander's edition of Kitto's Cyclopædia of Biblical Literature*, Article Rossi.

18 Salmas. Plinian. exercitat. in Solinum cap. xxxv. p. 432, edit. Ultraject.

Hebrew **רִבְּרִים** *to bind together, to associate*, and that they were called **רִבְּרִים** because they united together to keep the law. 16. Dr. Cohen suggests the Chaldee root **עֲשֵׂ** *to be strong*, and that they were called **עֲשֵׂי** because of their strength of mind to endure sufferings and to subdue their passions. (*Comp. Frankel's Monatschrift* viii. p. 272). 17. Oppenheim thinks that it may be the form **עֲשֵׂי** and stand for **עֲשֵׂי מִדְּרַת הַקֹּדֶשׁ** or **עֲשֵׂי מִדְּרַת הַטָּהוֹרָה** *observers of the laws of purity and holiness*. (*Ibid*). 18. Jellinek (*Ben Chanania* iv. 874), again derives it from the Hebrew **סִינִי** *sinus*, *σπίζωπα*, alluding to *the apron* which the Essenes wore; whilst, 19, Others again derived it from **נִסִּים** *pious*. The two last-mentioned explanations seem to have much to recommend them, they are natural and expressive of the characteristics of the brotherhood. I, however, incline to prefer the last, because it plainly connects the Essenes with an ancient Jewish brotherhood called *Chassidim* **חַסִּידִים** *the pious*, who preceded the Essenes, and from whom the latter took their rise. Those who wish to trace this connection, will find an article on *the Chassidim* in Dr. Alexander's edition of KITTO'S CYCLOPÆDIA OF BIBLICAL LITERATURE.

II.

I shall now give in chronological order the description of the Essenes found in the writings of Philo, Pliny, Josephus, Solinus, Porphyry, Eusebius and Epiphanius, and subjoin such notes as will explain the difficulties, and show the historical value of the respective documents.

As Philo is the oldest in point of time, we will begin with him. The exact date of the birth of this celebrated Jewish-Alexandrian philosopher is not known. It is, however, generally agreed that he was born in Alexandria between the years 20 and 1 B.C., and died about 60 A.D. Having resided all his lifetime in Alexandria, his information about the Essenes, who lived in Palestine, was derived from hearsay. This will account for some of the inaccuracies in his description of this remarkable brotherhood. He has given us two accounts of them, one in his treatise, entitled *Every Virtuous Man is Free*, and the other in his treatise, called *Apology for the Jews*. The latter is no longer extant, but Eusebius has preserved the fragments which speak of the Essenes in his work, entitled *Præparatio Evangelica* viii. 11. The description of the so-called contemplative Essenes, or Therapeutæ, which is generally appealed to as illustrating the doctrines and practices of the brotherhood in question, has nothing whatever to do with the real Palestinian Essenes; and it is almost certain that it is one of the many apocryphal productions fathered upon Philo, as may be seen from Graetz's elaborate and masterly analysis of it.¹ Philo's first account is contained in his treatise entitled *Every Virtuous Man is Free*, and is as follows:²

¹ Comp. Graetz, *Geschichte der Juden*. Dritter Band, Zweite Auflage, Leipzig, 1863, p. 461, &c.; Frankel, *Programm des jüdisch-theol. Seminars* von 1854.

² Comp. *Philonis Opera*, ed. Mangey. London, 1742, vol. ii. pp. 457-45.

“Palestine, and Syria too, which are inhabited by no slight portion of the numerous population of the Jews, are not barren of virtue. There are some among them called Essenes (*Ἐσσαῖοι*),—in number more than four thousand,—from, as I think, an incorrect derivation from the Greek homonym *hosiotes*, holiness (*καρῶνυμοι ὁσιότητος*), because they are above all others worshippers of God (*θεραπευταὶ θεοῦ*). They do not sacrifice any animals, but rather endeavour to make their own minds fit for holy offering (*ἱεροπρεπεῖς διανοίας*).³ They, in the first place, live in villages, avoiding cities on account of the habitual wickedness of the citizens, being sensible that as disease is contracted from breathing an impure atmosphere, so an incurable impression is made on the soul in such evil company.⁴ Some of them cultivate the earth, others are engaged in those diverse arts which promote peace, thus

³ Josephus, who also mentions this fact, distinctly says that their not offering sacrifices in the temple is owing to the different degree of holiness which they practised. (*Vide infra* p. 228.) From the repeated declarations in the Bible, that a life of uniform obedience and faithful service is far more acceptable to God than the cattle of a thousand hills (1 Sam. xv. 22; Ps. xl. 7; l. 7-14; li. 17; Prov. xxxi. 8; Isa. i. 11, 17; lxv. 3; Jer. vii. 21-23; Hos. vi. 6; xiv. 8; Micah, vi. 6-8), the Essenes could easily be reconciled to their abstaining from offering animal sacrifices, and would be led to attach infinitely greater importance to the presenting of their bodies a living sacrifice, holy and acceptable to God. (Comp. also Rom. xii. 1). This circumstance led Petitius to the conclusion that Herod, who was friendly to the Essenes in consequence of the favorable prophecy about him uttered by the Essene Menahem (*vide infra* p. 226), employed them to translate the Prophets and the Psalms into Greek, and that they availed themselves of the opportunity to introduce their tenets and rites into this version, now called the Septuagint. Thus, for instance, when David said “Sacrifice and burnt offering thou didst not desire, mine ears hast thou opened” (Ps. xl. 6), the Essenes rendered it “Sacrifice and burnt offering thou dost not desire, but a body hast thou prepared me,” interpolating three of their tenets. 1. They made the Prophet speak absolutely, as if God had entirely rejected sacrifices because they would offer him none. 2. By dropping the words, “mine ears hast thou opened,” they showed their disapprobation of slavery. (Comp. Exod. xxi). And 3, by substituting “a body hast thou prepared me,” they understood the college of devout Essenes, who met together as a body, and whom God appointed instead of sacrifice. Comp. Basnage, History of the Jews, English translation. London, 1708, p. 128.

⁴ This is not the only reason why the Essenes withdrew from cities. Their observance of the Levitical laws of purity which rendered them impure when they came in contact with those who did not live according to the same rules, was the principal cause of their living separately. (*Vide supra* p. 183, note 1.) Philo, however, states the first reason because the Greeks, for whom he wrote, understood it better than the second, which is so peculiarly Jewish in its character.

benefitting themselves and their neighbours. They do not lay up treasures of gold or silver,⁵ nor do they acquire large portions of land out of a desire for revenues, but provide themselves only with the absolute necessities of life. Although they are almost the only persons of all mankind who are without wealth and possessions—and this by their own choice rather than want of success—yet they regard themselves as the richest, because they hold that the supply of our wants, and contentment of mind, are riches, as in truth they are.⁶

“No maker of arrows, darts, spears, swords, helmets, breast-plates, or shields—no manufacturer of arms or engines of war, nor any man whatever who makes things belonging to war, or even such things as might lead to wickedness in times of peace, is to be found among them.⁷ Traffic, innkeeping, or navigation, they never so much as dream of, because they repudiate every inducement to covetousness. There is not a single slave to be found among them, for all are free, and mutually serve each other. They condemn owners of slaves, not only as unjust, inasmuch as they corrupt the principle of equality, but also as impious, because they destroy the law of nature, which like a mother brought forth and nourished all alike, and made them all legitimate brethren, not only in word but in deed; but this relationship, treacherous covetousness, rendered overbearing by success, has destroyed by engendering enmity instead of cordiality, and hatred instead of love.

“They leave the logical part of philosophy, as in no respect necessary for the acquisition of virtue, to the word catchers; and the natural part, as being too difficult for human nature, to the astrological babblers, excepting that part of it which treats upon the existence of God and the origin of the

⁵ The same thing Christ urged on his disciples. Comp. Matth. vi. 19-21.

⁶ This simple desire for the supply of our daily bread, and the contentment of mind here spoken of, are also commended by our Saviour. (Matth. vi. 11, 25-34.)

⁷ Believing that all they that take the sword shall perish with the sword. Comp. Matth. xxvi. 52.

universe;⁸ but the ethical part they thoroughly work out themselves, using as their guides the laws which their fathers inherited, and which it would have been impossible for the human mind to devise without divine inspiration. Herein they instruct themselves at all times, but more especially on the seventh day. For the seventh day is held holy, on which they abstain from all other work, and go to the sacred places called synagogues, sit according to order, the younger below the elder, and listen with becoming attention. Then one takes the Bible and reads it, and another of those who have most experience comes forward and expounds it, passing over that which is not generally known, for they philosophise on most things in symbols according to the ancient zeal.

"They are instructed in piety, holiness, righteousness, economy, politics, in knowledge of what is truly good, bad and indifferent, to choose things that are necessary, and to avoid the contrary. They use therein a threefold rule and definition, viz. : love of God, love of virtue, and love of mankind.⁹ Of their love to God, they give innumerable demonstrations—e.g. their constant and unalterable holiness (*ἀγνεία*) throughout the whole of their life ; their avoidance of oaths¹⁰ and falsehoods, and their firm belief that God is the source of all good, but of nothing evil. Of their love of virtue they give proofs in their contempt for money, fame, and pleasures,

8 The Apostle Paul, too, admonished the Colossians to "beware lest any man spoil you through philosophy." (Col. ii. 8.)

9 Thus also Christ, when he was asked which was the greatest commandment in the law, declared, love to God and love to our neighbour, and that on these two hang all the law and the prophets. (Comp. Matth. xxii. 36-40.)

10 Although the taking of oaths was discountenanced by the Jews generally (Comp. *Ecclus.* xxiii. 11, &c. ; and especially *Philo De decem oraculis* § 17, Opp. Tom. ii. p. 194, &c., ed. Mangey); and the Pharisees took great care to abstain as much as possible from using them (Comp. *Shevuoth* 89, b ; *Gittin* 85, a ; *Bemidbar Rabba* c. xxii); yet the Essenes were the only order who laid it down as a principle not to swear at all, but to say yea, yea, and nay, nay. So firmly and conscientiously did they adhere to it that Herod, who on ascending the throne had exacted an oath of allegiance from all the rest of the Jews, was obliged to absolve the Essenes from it. (Comp. *Joseph. Antiq.* book xv. chap. x. § 4). Christ too, laid it down as a principle for his disciples not to swear at all, but to say yea, yea, and nay, nay. (Comp. Matth. v. 33-37.)

their continence, endurance, in their satisfying their wants easily, simplicity, cheerfulness of temper, modesty, order, firmness, and every thing of the kind. As instances of their love to man, are to be mentioned their benevolence, equality, and their having all things in common, which is beyond all description, and about which it will not be out of place to speak here a little.

“First, then, no one has his own house, so that it also belongs to all. For, besides that, they all live together in sodalities; it is also open to those of the brotherhood who come from other places. Moreover, they have all one common treasury and store of provisions, common garments, and common food for all who eat together. Such a mode of sleeping together, living together, and eating together, could not be so easily established in fact among any other people; and indeed it would be impossible. For whatever they receive daily, if they work for wages, they do not retain it as their own, but give it to the common stock, and let every one that likes make common use of it.¹¹ Those that are sick are not neglected because they can earn nothing, but have what is necessary for their aid from the common stock, so that they ever fare richly without wanting anything. They manifest respect, reverence and care for the aged, just as children do for their parents, administering to them a thousand times with all plentifulness both with their hands and their counsels in their old age.

“Such champions of virtue does a philosophy produce which is free from the subtlety of Greek word-splitting, and which deals with subjects tending to the exercise of praiseworthy actions, and giving rise to invincible freedom. This was seen in the fact that many tyrants have arisen from time to time in that country, differing in character and conduct.

¹¹ This community of goods was also adopted by the early Christians, who, as we are told, “sold their possessions and goods, and parted them to all as every man needed.”—(Comp. Acts, ii. 45, iv. 34, 35.)

Some of them endeavoured to surpass in ferocity wild beasts ; they omitted no manner of barbarity, they sacrificed the vanquished in whole troops, or, like butchers, cut off pieces and limbs of those that were still living, and did not leave off till retributive justice, which governs the affairs of man, plunged them into similar miseries. Others, again, converted their frenzy and madness into a different kind of wickedness. They adopted an inexpressible bitterness, spake gently, and betrayed a ferocious temper under the mask of gentle language ;¹² they fawned like poisonous dogs, and brought about irremediable miseries, leaving behind them in the cities, as monuments of their impiety and hatred of mankind, the never to be forgotten miseries. But neither the cruel tyrant nor the wily hypocrite could get any advantage over the said brotherhood of Essenes or *holy ones* (Ἐσσηαῖον ἢ ὁσίον), but disarmed by the virtues of these men, all recognised them as independent and free by nature, praised their common meals and their community of goods, which surpasses all description, and is an evident proof of a perfect and very happy life."

Philo's second account, which has been preserved by Eusebius in his *Praep. Evang.*, viii, 11, from the lost treatise entitled *Apology for the Jews*, is as follows :—¹³

"Our lawgiver, Moses, formed innumerable (μυρίους) disciples into a fellowship called Essenes,¹⁴ who, as it appears, obtained this appellation by virtue of their holiness (παρὰ τὴν ὁσιότητα). They dwell in many cities of Judea, and in villages, and

¹² The account here given of the sufferings of the Essenes bears a very striking resemblance to the description in the *Epistle to the Hebrews* xi. 36–38 ; and it may be that the Apostle refers to this extraordinary brotherhood.

¹³ This fragment which Eusebius has preserved is given in Philo's Works, ed. Mangey, vol. ii., p. 622, *seq.*

¹⁴ The tracing of this brotherhood to Moses is in accordance with the practice which generally prevailed among the Jews of ascribing the origin of every law, mystical doctrine or system, which came into vogue in the course of time, either to Ezra, Moses, Noah or Adam. Thus we are told in the Jerusalem Talmud (*Pea*, ii. 6), and the Midrash (*Cohemoth*, 96 d.), that all the Scriptural learning which developed itself in course of time, and everything which a *Talmid Vatic* *mis* *ht*, were revealed to Moses beforehand on Mount Sinai.

in large and populous communities. Their order is not founded upon natural descent, but upon admiration for virtue and sincere love for man. Hence there are properly speaking no newly born ones among the Essenes, no children, no youths, as the dispositions of these are unstable and liable to change from the imperfections incident to their age;¹⁵ but they are all full grown men who are already approaching old age; and are no longer carried away by the impetuosity of their bodily passions, but possess the genuine and the only true and real liberty. A proof of their freedom is to be found in their life. None of them strives to acquire any private property, house, slave, farm, flocks, herds, or anything which might be regarded as a source of riches, but they all give everything to the common stock from which the common wants of all are alike supplied.

“ They all dwell together in the same place, form themselves into companies, societies, combinations and unions,¹⁶ and work together all their life for the common good of the brotherhood. The different members of the order are engaged in different employment; they work cheerfully and industriously, and never try to leave their employment on account of cold, heat, or any change of weather. They go to their daily work before the sun rises, and do not leave off till some time after it has set, when they return home rejoicing no less than those who have been exercising themselves in gymnastic contests.¹⁷ They believe that their employment is a sort of gymnastic exercise of more benefit to life, greater pleasure both to soul and body, and of a more enduring advantage than any mere athletic labours, because they can cheerfully continue in their

15 This refers to juvenile *members of the fraternity*, as the Essenes did adopt children, and trained them up to the practices of the order. *Vide infra* p. 217.

16 The four companies here mentioned most probably refer to the four different classes into which the Essenes were divided, described more minutely by Josephus. *Vide infra*, p. 223, note 45.

17 So also the Apostle Paul recommends us not to be slothful in business, but fervent in spirit, serving the Lord.—(Rom. xii. 11.)

work as a recreation even when youth and bodily strength are gone. Those who are acquainted with the cultivation of the land are engaged in agriculture; others, again, who understand the management of animals, attend to the flocks; some are skilful in the management of bees; and others again, are artizans and manufacturers, thus guarding against the want of anything. They do not omit anything which is requisite to supply the absolute necessities of life.

“The appointed steward and general manager receives the wages which the different people get for their respective employments, and forthwith buys plenty of food and other necessaries of life. They eat at the same table, and have every day the same food, being lovers of frugality and moderation, and averse to luxury and extravagance as a disease of both mind and body. Not only is their table in common, but their dress too is in common. They have a store of rough cloaks in the winter, and in the summer cheap garments without sleeves, to which every one can go and freely take whichever kind he wants, for whatever belongs to one belongs to all, and whatever belongs to all belongs to each individual.

“If one of them is sick, he is cured from the common resources, and is attended to by the general care and anxiety of the whole body. The old men, even if they happen to be childless,¹⁸ end their lives in a most happy, prosperous and tenderly cared for old age, as if they were not only the fathers of many children, but were even also particularly happy in an affectionate offspring. They are looked upon by such a number of people as worthy of so much honour and provident regard, that they think themselves bound to care for them even more from inclination than from any tie of natural affection.

“Perceiving, with more than ordinary acuteness and accuracy, what is alone, or at least above all other things, calculated

is if he belongs to the class of Essenes who practised celibacy; for those among them who had wives and families. *Vide infra* p. 225.

to dissolve such connections, they repudiate marriage; and at the same time practice continence in an eminent degree. For no one of the Essenes marries a wife, because woman is a selfish and excessively jealous creature, and has great power to destroy the morals of man, and to mislead with continual tricks; for she is always devising flattering speeches and other kinds of hypocrisy as on a stage; bewitching the eyes and the ears; and when they are subjugated like things stultified, she proceeds to undermine the ruling intellect.¹⁹

“But when she has children, the woman becomes full of pride and arrogance, audaciously speaks out that which she previously merely indicated in treacherous disguise, and without any shame compels one to do whatever is hostile to the brotherhood; for he who is chained by the charms of a woman or cares for children by necessity of nature, is no longer the same person to others, but is entirely changed, having unawares become a slave instead of a free man.

19 The Mosaic law regards conjugal intercourse as polluting, and enjoins bathing after it. (Levit. xv. 18.) Hence, when the children of Israel had to sanctify themselves in the highest degree, so as to be fit to receive the law from Mount Sinai, they were commanded not to approach their wives (Exod. xix. 15). Hence, also, those who had the charge of the shew-bread polluted the sacred loaves by going to their wives (1 Sam. xxi. 4). And hence the remark of the Apostle Paul, that in order to give themselves to fasting and prayer, man and wife may keep aloof from each other by mutual consent (1 Cor. vii. 5). The same laws obtained among all nations of antiquity. Thus, among the Egyptians, Babylonians, Arabians, Greeks and Romans, both man and wife had to bathe after connubial intercourse (*Herod.* i. 198). No one was allowed to go after it to the temple without bathing (*Herod.* ii. 84; *Suet. Aug.* xciv. 5; *Pers.* ii. 50, &c.); and the priests had to abstain from approaching their wives when they were ministering in holy things (*Porphyrus, de Abstinencia*, lib. ii. 50; iv. 7; *Plutarch. Sympos.* iii. 6; *Tibul.* lib. ii. Eleg. 1, 11, &c.; *Ovid. Metam.* x. 434, &c.) Now, as the Essenes strove to be in a perpetual state of sanctification, regarded their refectory as a sanctuary and their meals as sacraments, and most anxiously avoided contact with every thing that defiled, they had of necessity to extend these Mosaic laws, which enjoin abstinence from connubial intercourse as a means of sanctification, and which regard those who indulged in it as defiled, to the whole course of their life; and they had therefore to be celibates. This extension of the Mosaic law was moreover deemed desirable in consequence of the general conviction which the Jews entertained, in common with other nations, that no woman remains faithful to her husband, and that they all defile the bed of marriage. Philo, in the passage before us, and Josephus, as we shall see afterwards (*vide infra* p. 217 § 2), only give the latter reason, to suit their Greek readers who could both understand it better and sympathise with it more than with the former.

“Such is the enviable system of life of the Essenes, so that not only private individuals but even mighty kings have admired them, venerated their brotherhood, and rendered their dignity and nobleness still higher by the praise and honours which they lavished upon them.”

Next, in point of time, is Caius Plinius Secundus, called Major, or the elder, the celebrated author of the *Historia Naturalis*, who was born in A.D. 23, and died A.D. 79. Pliny's notice of the Essenes, which is to be found in his Natural History, book v., chap. xvii., is as follows :

“Towards the west [of the sea] and sufficiently distant from it, so as to escape its noxious exhalations (*ab occidente litora Esseni fugiunt, usque qua nocent*), are the Essenes. They are a hermitical society, marvellous beyond all others throughout the whole earth. They live without any women, without gratifying sensual desires, without money, and in the company of palm trees. Their ranks are daily made up by multitudes of new comers who resort to them ; and who being weary of life, and driven by the surges of ill-fortune, adopt their manner of life. Thus it is that, through thousands of ages (*per saeculorum millia*),²⁰ incredible to relate, this people prolongs its existence without any one being born among them : so fruitful to them are the weary lives of others.”

Next in point of time is Josephus, or Joseph ben Matthias, better known by the name Flavius Josephus, who was born in Jerusalem about 37, A.D. The description which this learned Jewish warrior and historian gives us of the Essenes, although somewhat marred by being made to harmonise with the systems of Greek philosophy, is very important, inasmuch as Josephus was not only a Palestinian Jew, but at one period of his life had actually joined the brotherhood. He tells us in his autobiography, that when sixteen years old he determined to

ply a repetition of what the Essenes themselves said about their
 once with a common practice among the Jews.—*Vide supra*

examine for himself the respective merits of the three predominant sects, viz., of the Pharisees, Sadducees and Essenes, with the view of making a selection from among them. His accounts of the Essenes are dispersed through his works. The following is the first description contained in his *Jewish War*, book ii, chap. viii, sec. 2—13.

“ § 2. There are three sects of philosophers among the Jews. The followers of the first are called Pharisees, of the second Sadducees, and of the third, who really seem to practise holiness, Essenes.²¹ Jews by birth, they love each other more than the others.²² They reject pleasure as an evil, and regard continence and not yielding to passions as virtues. They despise marriage, and adopt the children of others while still tender and susceptible of instruction,²³ and regard them as their own relations, and train them in their practices. They do not, however, repudiate marriage, and its consequent succession of the race in themselves; but they are afraid of the lasciviousness of women, and are persuaded that none of them preserve their fidelity to one man.²⁴

“ § 3. They despise riches, have all things in common in a very admirable manner, and there is not one to be found among them who is richer than another; for it is a law that those who enter the sect must give up their possessions to the

21 This representation of the three Jewish sects as different philosophical schools, and the supposed resemblance of the Essenes to the Pythagoreans, which he mentions afterwards, (*vide infra* *Antiq.* xv. 10; § 4, p. 226) and which have misled modern writers, are nothing but a desire on the part of Josephus to make the divers teachings of his co-religionists correspond to the different systems of Greek philosophy. It is this anxiety to shew the Gentiles, for whom he wrote, how much the Jews resemble them both in doctrine and practice, which detracts from the merits of Josephus' history.

22 This love for the brotherhood, which the Essenes possessed to so extraordinary a degree, was also urged by the Evangelists and Apostles on the early Christians (comp. John xiv. 17; Rom. xiii. 8; 1 Tim. iv. 9; 1 Peter i. 28 xi. 17; 1 John iii. 23; iv. 7, 11; v. 2).

23 This does not contradict Philo's remark (*vide supra* p. 218), as Herzfeld supposes, (*Geschichte des Volkes Israel*, vol ii. p. 375); since the two statements refer to two different things. The former affirms that they do not receive children into the noviciate, whilst the latter speaks of their adopting and educating them, which is a distinct thing from becoming a novice.

24 *Vide supra*, p. 215, note 19.

society as common property,²⁵ so that there is not to be seen among them all, either the abjectness of poverty or the distinction of riches ; but as every man's goods are cast into a common treasury, they all, like brothers, have one patrimony. They regard ointment as defiling ; and if one happens to be anointed against his will, he immediately wipes it off his body.²⁶ To be unadorned but dressed in white they regard as commendable. They have stewards of their common property, appointed by general election, and every one without distinction is proposed for all the offices.

“ § 4. They have no separate city, but some of them live anywhere ; and if any of the society come from other places, whatever they have lies open for them, just as if it were their own ; and they go to those whom they have never seen before as if they had been most intimate. Hence they take nothing with them when they go on a journey,²⁷ but arms for defence against robbers. A steward is appointed in every city of this order to provide strangers with clothes and other necessities.²⁸ The keeping and appearance of their body are such as of children brought up in fear ; they change neither garments nor shoes till they are worn out or made unfit by time.²⁹ They neither sell nor buy anything among themselves, but everyone gives of that which he has to him that wants, and gets from

25 So our Lord urged on the young man, who lived so exemplary a life in the performance of God's law, and whom he loved, that unless he gave up his property he could not follow him (comp. *Matth. xix. 21* ; *Mark x. 21* ; *Luke xviii. 22*), and commanded his disciples to sell all their possessions and distribute the money among the poor (comp. *Luke xii. 33*.)

26 Ointment being a luxury (comp. *Ecc. ix. 8* ; *Dan. x. 2*), the Essenes regarded the use of it as extravagance, and contrary to the simplicity of their manner of life.

27 The manner in which Christ commanded his disciples to depart on their journey (*Mark vi. 8-10*) is the same which these pious Essenes are here said to have adopted. This also explains the injunction given by our Saviour to his disciples in *Luke xxii. 36*, about taking arms with them, which has so greatly perplexed commentators who were unacquainted with the customs of the Essenes.

28 The Pharisees, too, had a steward in every place to supply the needy with cloth:- (Comp. *Pes viii. 7* ; *Baba Bathra 8 a* ; *Sabbath 118*.)

29 "

4, &c.

him that which he needs; and even without requital they can freely take whatever they want.

“§ 5. Their piety towards God is extraordinary, for they never speak about worldly matters before the sun rises, but offer up, with their faces towards it, some of the prayers transmitted by their forefathers, as if they supplicated it to rise.³⁰ Hereupon, they are all sent by the overseers, every one to work in the department in which he is skilled; and, having diligently laboured till the fifth hour, assemble again together in one place, girt round with their linen apron, and have a baptism with cold water.³¹ After this lustration they resort to a special house, in which no one of another faith is admitted, and go to the refectory purified as into a holy temple.³² Having quietly taken their seats the baker gives every one a loaf of bread according to order, and the cook places before each one a dish with one sort of food. The priest commences with prayer, and no one is allowed to taste his food before grace is said. He also returns thanks after the meal; for both at the commencement and at the conclusion they praise God as the giver of their food.³³

30 Some translate it “they offer prayer (εἰς τὸν ἥλιον) to the sun.” But it is utterly inconceivable that the Essenes, who were such thorough Jews, and so exemplary for their adoration of the Holy One of Israel, would be guilty of idolatry by worshipping the sun. Besides, the prayer in question is described as one transmitted by the fathers. And can it be imagined that there existed among the Jews a national prayer to this luminary in direct violation of the first commandment, and of what is so expressly forbidden in Deut. iv. 19? The prayer therefore here spoken of is the well known national morning hymn of praise (שְׁמַחַת מִצְרַיִם) for the return of the light of the day, which still forms a part of the Jewish service to the present day. *Comp Berachoth 9 b; Rappaport in the Bikure Ha-Ittim, vol. x., Vienna 1829, p. 115, and infra p. 245.*

31 This practice of bathing before meals was also common among the Pharisees (comp. *Chagiga*, 18, b), and as the Essenes covered themselves with their aprons so the Pharisees put on their *Talith* during their baptisms. (*Comp. Berachoth 24, b.*)

32 The Pharisees, too, regarded the refectory as a sanctuary, and compared its table to the altar in the temple, because the altar in the temple is represented as the table of the Lord (Ezekiel xli, 22). Hence, R. Jochanan and R. Eleazar remark—“As long as the temple stood the altar atoned for the sins of Israel, but now it is man's table which atones for his sins.” (*Talmud Berachoth, 55a*). Hence the Chaldee paraphrase of Ezekiel xii. 22, and the remarks of Rashi and Kimchi on this passage, which cannot be understood unless this traditional interpretation is borne in mind. *Comp. also Aboth iii, 8.*

33 This was also the practice of the Pharisees, and is to the present day the custom among the orthodox Jews.

Whensoever they put off their white garments as if they were sacred, and begin themselves again to their work till evening. On returning home they take their supper together, at which strangers who happen to be in the place, are allowed to sit down with them. No noise or tumult ever desecrates their house, but they bear every the same part in the conversation in turn : and the silence of those who are within appears to those that are without as some still mystery. The cause of this is the unvarnished solitude, as well as the fact that their eating and drinking are so measured out as just to suffice the cravings of nature.

“§ 6. Whilst they do nothing without the injunctions of their overseers, yet there are two things in which they have free action, viz., helping the needy, and shewing mercy ; to help the deserving when they are in want, and to give food to the hungry, they have perfect liberty ; but to give anything to their relations they are not allowed without the permission of the overseers. They are just dispensers of their anger, curbers of their passions, representatives of fidelity, ministers of peace ; and every word with them is of more force than an oath. They avoid taking an oath, and regard it as worse than perjury ; for they say that he who is not believed without calling on God to witness is already condemned of falsehood.³⁴ They take extraordinarily great pains in studying the writings of the ancients, and select that especially which is beneficial both for the soul and body ; hence they investigate medical roots and the property of minerals for the cure of distempers.³⁵

“§ 7. When any one desires to enter the sect, he is not immediately admitted, but although he has to remain a whole

³⁴ This paragraph almost embodies the sentiments uttered by our Saviour in *Matth. chap. v.*

³⁵ These ancient books on magical cures and exorcisms were the reputed works of Solomon, who, according to the Talmud as well as the Byzantine and Arabian writers, composed treatises on miraculous cures and driving out evil spirits. (*Gen. Rabbim* 56 a ; *Fabricius, Codex pseudepigraphus Vet. Test.* p. 1042, &c. ; *the Legends der Muselmänner*, p. 225-279). Josephus tells

year without, yet he is obliged to observe their ascetic rules of living, and they give him an axe, an apron as mentioned above, and a white garment.³⁶ If he has given proof of continence during this time, he approaches nearer to their life and partakes of the holier water of purification; but is still not as yet admitted to their common table. Having thus given proof of his perseverance, his conduct is tested two more years, and, if found worthy, he is admitted into the society. But before he touches the common meal, he swears, by most awful oaths,³⁷ first to fear God, and next to exercise justice towards all men—neither to wrong any one of his own accord nor by the command of others; always to detest the wicked and side with the righteous; ever to keep faith inviolable with all men, especially with those in authority, for no one comes to office without the will of God;³⁸ not to be proud of his power nor to outshine his subordinates, either in his garments or greater finery, if he himself should

us elsewhere that some of these Solomonic productions still existed in his own days, and that he had actually seen demons driven out and people cured by their aid. (*Comp. Antiq.* book viii. chap. ii. § 5.) This account most strikingly illustrates what Christ says in Matth. xii. 27.

36 This custom has its origin in the extension of a Mosaic law. The hosts of the Lord are commanded in Deut. xxiii 13, 15, to have spades among the martial instruments in order to bury therewith their excrements without the camp, and thus to keep themselves pure from every pollution, and to be a holy camp, because the Holy One of Israel dwells in the midst thereof. Now as the Essenes strove to be, in a pre-eminent sense, the spiritual hosts of the Lord, every one of them was obliged to have this spade in order to guard their sacred camp from defilement. For this reason the apron was also given to cover their nakedness in their numerous baptisms, and thus to keep their thoughts from dwelling upon anything which might lead to impurity; whilst the white garment was the symbol of their holiness. This, however, was not peculiar to the Essenes, as the Talmud tells us that when any one applied to become a member of the Pharisaic order (דור), he had to pass through a noviciate of twelve months, at the expiration of which he received a sort of garment called כנפים, and having duly qualified himself in this stage, he was afterwards admitted to the holier lustrations (מקבילין למטה). (*Comp. Tosifta Demai* c. 11; *Jerusalem Demai* ii. 3; *Babylonian Becharoth* 30, 6).

37 This was the only occasion on which the Essenes were permitted to take an oath.

38 This does not refer to governments generally, as Gfrörer will have it (*Philo und die jüdisch-alexandrinische Theosophie*, vol. ii, p. 333, &c.), but to the office of overseer or steward among the brotherhood, as is evident from the immediately following statement, which most unquestionably pledges every Essene to retain his simplicity of character if he should ever attain to any official position or stewardship in the order.

attain to office ; always to love truth and strive to reclaim all liars ; to keep his hands clear from stealing, and his mind from unholy gain ; not to conceal anything from the brotherhood, nor disclose anything belonging to them to those without, though it were at the hazard of his life. He has, moreover, to swear not to communicate to any one their doctrines in any other way than he has received them ;³⁹ to abstain from robbing the commonwealth ; and equally to preserve the writings of the society and the names of the angels.⁴⁰ By such oaths they bind those who enter the brotherhood.

“§ 8. Such as are caught in heinous sins are excommunicated from the society ; and the excommunicated frequently die a miserable death. For, being bound by oaths and customs, they cannot receive food from any out of the society, so that they are forced to eat herbs till, their bodies being famished with hunger, they perish.⁴¹ Hence they compassionately receive many of them again when they are at their last gasp, thinking that suffering, approaching unto death, is sufficient for their sins.

“§ 9. In their verdicts they are most exact and just, and never give sentence if there are less than a hundred of the

39 This is not peculiar to the Essenes. The Pharisees, too, would not indiscriminately propound the mysteries of the cosmogony and the theosophy, which, according to them, are contained in the history of the Creation and in the vision of Ezekiel, except to those who were regularly initiated in the order. Comp. Mishna Chagiga, ii, 1.

40 This evidently refers to the secrets of the *Tetragrammaton*, and the angelology which played so important a part among the Jewish mystics from time immemorial. Comp. Wisdom of Solomon vii. 20 ; Mishna Chagiga, ii, 1.

41 The reason why he ate herbs and not bread, or the simple dish which the order generally took, is that, being bound by an oath to observe the practices of the brotherhood, he could only accept meals from those who lived according to the highest degree of purity (על מדרגה מדרגה), and who, as a matter of course, kept their meals according to this degree. But as such a mode of life was of very uncommon occurrence, the excommunicated Essene was obliged to live on herbs or vegetables which he had to pluck himself ; for, according to the Talmud, plants are only then considered unclean when they are cut off and water is poured on them (משוםכך נקרא מטהר מטהר). As for Josephus' saying that he died a miserable death, and that he could only eat grass (ποιρῶν), this is an instance of his exaggerating and colouring his subject.

brotherhood present : but what is then decreed is irrevocable. Next to God they have the highest veneration for the name of the lawgiver, Moses, and punish with death any one who blasphemes it. To submit to the elders and to the majority they regard as a duty : hence, when ten of them sit together, no one will speak if the other nine do not agree to it. They avoid spitting before the face, or to the right hand,⁴² and are also stricter than all other Jews not to touch any labour on the Sabbath day—for they not only prepare their Sabbath-day's food the day before, that they may not kindle a fire on that day, but they will not move a vessel out of its place⁴³ nor go to ease nature. On all other days they dig a pit of a foot deep with the spade (such an one being given to the novice), and having covered it all round with a cover, that it may not offend the Divine rays, they set themselves over it, and then put the earth that was dug out again into the pit ; and do this, after having chosen the most lonely places. And although the voiding of bodily excrements is natural, yet it is their custom to bathe after it, as if they had been defiled.⁴⁴

“ § 10. They are divided, according to the time of leading this mode of life, into four different classes, and the juniors are so much inferior to the seniors, that the latter must wash themselves when they happen to touch the former, as if they had been defiled by a stranger.⁴⁵ They live to a great age, so

42 The Pharisees, too, regarded ten persons as constituting a complete number for divine worship, held the assembling of such a number as sacred, and would not spit in their presence. (*Comp. Berachoth* 54 a ; *Jerusalem Berachoth* iii. 6 ; *Aboth* iii. 6.)

43 This is not peculiar to the Essenes ; for the Pharisees, too, would not remove a vessel on the Sabbath (*comp. Tosifla Succa*, iii) ; and the orthodox Jews, to the present day, will not even carry a handkerchief on the Sabbath ; they tie it round the body to serve as a girdle, so that it might not be said that they carry the weight of even so small a thing on the sacred day. *Comp. also Mark xi*, 16.

44 Neither is this peculiar to the Essenes ; for not only did the Pharisees of old do the same (*comp. Ioma* 28, a) ; but the orthodox Jews of the present day wash after performing the duties of nature.

45 This division of the brotherhood into four classes, as well as the impurity contracted by the higher class when touching one who belonged to a lower class of purity, also existed among the Pharisees. (*Vide supra*, p. 188, note 1.)

that many of them live to above a hundred years—arising from the simplicity of their diet, as it appears to me, and from their order. They despise suffering, and overcome pain by fortitude. Death, if connected with honour, they look upon as better than long life. Of the firmness of their minds in all cases the war with the Romans has given ample proof; in which, though they were tortured, racked, burned, squeezed, and subjected to all the instruments of torment, that they might be forced to blaspheme the lawgiver or eat what was forbidden, yet they could not be made to do either of them; nor would they even once flatter their tormentors or shed a tear, but, smiling through their torments and mocking their tormentors, they cheerfully yielded up their souls, as those who would soon receive them back again.⁴⁶

“ § 11. For they firmly believe that the bodies perish and their substance is not enduring, but that the souls are immortal—continue for ever and come out of the most subtile ether—are enveloped by their bodies, to which they are attracted through a natural inclination, as if by hedges—and that when freed from the bonds of the body, they, as if released from a long servitude, rejoice and mount upwards. In harmony with the opinion of the Greeks,⁴⁷ they say that for the good souls there is a life beyond the ocean, and a region which is never molested either with showers or snow or intense heat—is always refreshed with the gentle gales of wind constantly breathing from the ocean; whilst to the wicked souls they assign a dark and cold corner, full of never-ceasing punishments. And it seems to be according to the same opinion that the Greeks assigned to their valiant men, whom they called heroes and demigods, the Island of the Blessed, but to the souls of the wicked the regions of the impious in Hades;

⁴⁶ Philo, too, speaks of this fact. (*Vide supra* p. 212)

⁴⁷ is another instance of the anxiety of Josephus to make the different Judaism harmonise with the Greek mode of thinking.

as also their fables speak of several there punished, as Sisyphus and Tantalus and Ixion and Tityus. This they teach, partly because they believe that the souls are immortal, and partly for the encouragement of virtue and the discouragement of vice. For good men are made better in their lives by the hope of reward after their death, whilst the passions of the wicked are restrained by the fear they are in that, although they should be concealed in this life, after death they must suffer everlasting punishment. This is the doctrine of the Essenes about the soul—possessing thereby an irresistible bait for those who have once tasted their philosophy.

“ § 12. There are also some among them who undertake to foretell future events, having been brought up from their youth in the study of the sacred Scripture, in divers purifications, and in the sayings of the prophets; and it is very seldom that they fail in their predictions.

“ § 13. There is also another order of Essenes who, in their way of living, customs, and laws exactly agree with the others, excepting only that they differ from them about marriage. For they believe that those who do not marry cut off the principal part of human life—that is, succession—especially that, if all were of the same opinion, the whole race would soon be extinguished. They, however, try their spouses for three years, and after giving evidence, by three natural purgations, that they are fit to bear children, they marry them. They have no connubial intercourse with them when with child, to show that they do not marry to gratify lust, but only to have children. The women, too, have their garments on when they have baths, just as the men have on their aprons. Such are the customs of this brotherhood.”

The next mention which Josephus makes of them is in his *Antiq.* Book xiii. chap. v. § 9, and is as follows:—

“ § 9. At this time [166 B.C.] there were three sects (*αἱρέσεις*)

among the Jews, differing in their opinion about human affairs. The first was called the sect of the Pharisees, the second the sect of the Sadducees, and the third the sect of the Essenes. The Pharisees affirm that some things only, but not all, are the work of fate (τὰς εἰσπραμένους), and some are in our own power, whether they should take place or whether they should not occur; the sect of the Essenes maintain that fate governs all things,⁴⁸ and that nothing can befall man contrary to its determination and will (ἑῷ); whilst the Sadducees reject fate, saying that there is no such thing, and that human events do not proceed from it, and ascribe all to ourselves, so that we ourselves are the cause of our fortunes, and receive what is evil from our own inconsiderateness. However, I have given a more minute description of this in the second book of the Jewish War."

He speaks of them again in Antiq. Book xv. chap. x. § 4, towards the end, and § 5, as follows:—

"§ 4. The Essenes, as we call them, were also exempted from this necessity [of taking an oath of allegiance to Herod]. These men live the same kind of life which among the Greeks has been ordered by Pythagoras.⁴⁹ I have discoursed more fully about them elsewhere. The reason, however, why Herod had the Essenes in such honour, and thought more highly of them than of mortal nature, is worthy of record. For this account, too, is not unsuitable for this history, inasmuch as it shows the people's opinion about the Essenes.

"§ 5. There was a certain Essene, named Menahem (Μενάμπος

48 It is evident that Josephus, as an orthodox and pious Jew, cannot mean by εἰσπραμένη the *Fatum* of the Stoics, which was above the deities; but intends to convey thereby the idea of *eternal counsels* and *predestination* spoken of in the Bible. Indeed, elsewhere Josephus tells us distinctly that "the doctrine of the Essenes delights to leave all things to God" (*vide infra* p. 228); so that that which is in the one case ascribed to *fate*, is in the other ascribed to *God*.

49 No more regard is to be paid to this remark, that the Essenes are like the Persians, than to the assertion which Josephus makes afterwards that they in their manner of life to the Polistae, (*vide infra* p. 229), as his aim was to show how much the Jewish sects resembled the Greek systems of philosophy. Comp. p. 217 note 21.

= **מנחם**) who was celebrated not only for the uprightness of his conduct, but also for the fore-knowledge of the future proceeding from God. When he once saw Herod, as a boy going to school, he addressed him by the name of 'King of the Jews.'⁵⁰ Herod thought that he did not know him or that he jested, and reminded him that he was of common origin. But Menahem smiled on him most friendly, clapped him on the back with his hand, and said—'Thou wilt, nevertheless, be king, and wilt begin thy reign happily, for God has found thee worthy of it. And remember the blows that Menahem has given thee, as being the symbol of the change of thy fortune. For this assurance will be salutary for thee when thou wilt love justice and piety towards God and equity towards thy citizens. However, I know that thou wilt not be such a one, for I can perceive it all. Thou wilt, indeed, excel more than any one in happiness, and obtain an everlasting reputation, but thou wilt forget piety and justice. This will not be concealed from God, for he will visit thee with his wrath for it, towards the end of thy life.' Herod paid very little attention to it at that time, as he had no hope of it. But as he soon afterwards advanced to the dignity of king and was happy, he ordered Menahem to come to him in the height of his dominion, and asked him how long he should reign; but Menahem did not tell him. Seeing that he was silent, he asked again whether he should reign ten years. Whereupon he replied, 'Yes; twenty, nay, thirty years;' but did not determine the exact limit of his reign. Herod, rejoicing on it, gave Menahem his hand and dismissed him, and from that time continued to honour the Essenes. I thought of relating this to the readers (though to some it may seem incredible), and of making

⁵⁰ The fact that Menahem saw Herod in Jerusalem, and that the Essene Judah, as Josephus tells us elsewhere (*comp. Jewish War*, book i. chap. iii. § 5; *Antiq.* book xiii. chap. xi. § 2), foretold in the temple the death of Antigones, clearly shows that the Essenes did not at first form a separate community, but lived together with the rest of their Jewish brethren.

it known, as it concerns us, because many of the Essenes are highly esteemed for their virtuous conduct and knowledge of Divine things."

Josephus also relates instances in which Essenes foretold future events, in *Antiq.*, book xviii., chap. ii., § 2 ; book xviii., chap. xiii. § 3 ; and *Jewish War*, book 1, chap. iii., § 5.

The last account which Josephus gives us is to be found in his *Antiq.*, book xviii., chap. i., § 2 and 5.

" § 2. There have been three philosophies among the Jews ever since the ancient time of the fathers (*ἐκ τοῦ πάναρχαίου τῶν πατρῶν*), that of the Essenes, and that of the Sadducees, and a third which the so-called Pharisees followed. Although I have already spoken of them in the second book of the *Jewish War*, yet will I mention here also something about them.

" § 5. The doctrine of the Essenes delights in leaving all to God (*Θεῷ καταλιπεῖν φιλεῖ τὰ πάντα*). They regard the soul as immortal, and say that the attainment to virtue must be fought for with all our might. Although they send consecrated gifts to the Temple, yet they never bring any sacrifice on account of the different rules of purity which they observe ; hence, being excluded from the common sanctuary, they offer sacrifices in themselves (spiritually). Otherwise, they are in their manner of life the best of men, and employ themselves wholly in the labour of agriculture. Their uprightness is to be admired above all others who endeavour to practice virtue ; such uprightness, which is by no means to be found among the Greeks and foreigners, is not of recent date, but has existed among them from times of yore (*ἐκ παλαιῶν*), striving most scrupulously not to disturb the community of goods, and that the rich should not enjoy more of the common property than the poor. This is the conduct of this people
 more than four thousand in number. They never
 wives, nor endeavour after the possession of property ;

for they believe that the latter leads to injustice, and the former yields opportunities for domestic discord. Living by themselves they serve each other. They choose good men, who are also priests, to be the stewards of their incomes and the produce of the fields, as well as to procure the corn and food. They do not differ at all in their living, but are more like those whom the Dacæ call Polistæe.”

We notice next the account of Caius Julius Solinus, the author of the Geographical compendium called *Polyhistor*, who flourished about 238 A.D. His accounts, which are to be found in chap. xxxv. § 7-10 of his work, are evidently derived from Pliny.

“In the interior of Judea, towards the west, are the Essenes, who differ from the usages of all other nations in their marvellous constitutions, and who, according to my opinion, have been appointed by divine providence for this mode of life. No woman is to be found there; connubial pleasures they have entirely renounced; money they know not, and palm-berries are their food.⁵¹ Not a single birth takes place there, and yet there is no want of population. The place itself is devoted to modesty. Although a very large number of persons run to it from all quarters, yet none is admitted who is not thought to possess purity, fidelity and innocence; for, if one has been guilty of the slightest misdemeanour, though he endeavour to obtain admission by offering never so large a fortune, he is excluded by a divine decree. Thus it is that through an immense space of ages (*per immensum spatium saeculorum*), incredible to relate,⁵² this society is perpetuated though no child is born among them.”

51 Pliny, whom Solinus copies, simply says that the Essenes live in the society of palm-trees (*socia palmarum*), to form an antithesis with the appellation a solitary community (*sola gens*); and this is perfectly correct. But Solinus' alteration of it into “palm-berries are their food” (*palms victitant*) is incorrect, inasmuch as they lived from the cultivation of the land, bees, &c.

52 This is simply a reiteration of what Pliny says about the antiquity of the Essenes.

The next account is that of Porphyry, the neo-Platonic philosopher and celebrated antagonist of Christianity, who was born 233 A.D. and died about 303 A.D. His description of the Essenes, which is given in his treatise *On the Abstinence from Animals Food* (Lugdunæ ap. Morillon, 1630, p. 411, &c.), is, as he himself tells us, taken from Josephus. He has, however, made some alterations, as may be seen from the following:

“There were three sorts of philosophers among the Jews, the first were looked by the Pharisees, the second by the Sadducees, and the third, who seemed the most honourable mannerly, by the Essenes. The latter formed such a society as Josephus has described it in different parts of his works, as well as in the second book of the Jewish History, which he composed in seven books, as in the eighteenth book of his Antiquities, which he composed in twenty books, and in the second part to the Greeks.”

“The Essenes are Jews by birth, and love one another more than other people. They avoid sensual enjoyments as vices, and regard continence and the power to resist the passions as the first virtue; they despise marriage and adopt the children of strangers, whilst still young and suitable for instruction, regard them as their own, and train them in their usages. They do not repudiate matrimony and child birth in themselves, but they guard against the sensuality of women. They despise riches, and there is a wonderful community of goods among them. There is no one found among them who occupies a distinguished position through his wealth; for they have a law that those who enter the society give up their possessions to the brotherhood, so that there is no such thing among them as abjectness of poverty or arrogance of riches; but the possessions of all put together form a fraternal and unity. If one of them happens to be inadver-

[Josephus, addressed to the Greeks, is no longer extant.

tently anointed, he immediately washes his whole body ; for they regard it as praiseworthy to have a dry skin, and they are always dressed in white. They appoint stewards to manage their common property ; and every one, without distinction, is eligible for all the offices.

“ They are not confined to one city, but live in different places, and everything they have is at the service of the members who happen to come from another city. Though meeting for the first time they at once salute each other as intimate friends (*ἰσασιν ἄλλους συνήθως*) ; hence they travel without taking anything with them. They do not change either garments or sandals till they are torn or worn out by age ; they neither buy nor sell, but every one gives of that which he has to him that wants it, and receives that which he needs ; but even without receiving anything in return they freely communicate to him that wants. Their piety towards God is extraordinary. None of them speak about anything profane before the sun rises ; but they offer to it some of the prayers transmitted to them by their forefathers, as if they supplicated it to rise, &c., &c.” He repeats almost literally the whole of § 5 of Josephus *On the Jewish War*, book ii. chap. viii., which we have given above, p. 219.

Porphyry omits § 6 of Josephus, but gives, with a few verbal alterations, both the whole of § 7, which describes the admission into the order, and § 8, which describes the punishment. He omits the greater part of § 9, and adds the following statement, which is not to be found in Josephus. “ Their food is so poor and scanty that they do not require to ease nature on the Sabbath,⁵⁴ which they devote to singing praises to God and to rest.” He omits from § 10 the description of the division of the Essenes into four classes, and

⁵⁴ This is simply imaginary ; the real reason for it was, that they could not dig on the Sabbath the hole that was requisite for it without, as they thought, violating the sanctity of the day, as to do so was considered a labour.

simply mentions firmness in suffering and death. He also omits from § 11 the whole piece beginning with the words "In harmony with the opinion of the Greeks, &c.;" whilst he not only gives the whole of § 12, but has also the following addition, "With such a manner of life, and with their firm adhesion to truthfulness and piety, there are naturally many among them who can foretel future events, &c.;" and concludes with the words, "This is the nature of the order of the Essenes among the Jews," omitting altogether what Josephus says in § 13 about those Essenes who marry.

Epiphanius, bishop of Constantia and metropolitan of Cyprus, who was born in Bezanduca, a small town of Palestine, in the first part of the fourth century, and died in 403, has also given us some brief notices of the Essenes in his celebrated work *Against the Heretics*. His first notice is to be found in *Adver. Haer.*, lib. i. ord. x. p. 28, ed. Col., 1682, under the title *Against the Essenes and the Samaritans*, and is as follows :

"The Essenes continue in their first position, and have not altered at all. According to them there have been some dissensions among the Gorthenes, in consequence of some difference of opinion which has taken place among them—I mean among the Sebuens, Essenes and Gorthenes. The difference of opinion relates to the following matter. The law of Moses commands the Israelites of all places to come up to Jerusalem to the three festivals, viz., the feasts of the Passover, Pentecost and Tabernacles. As the Jews in Judea and Samaria were largely dispersed, it is supposed that those of them who made their pilgrimage to Jerusalem went through Samaritan cities, and as the Samaritans assemble at the same time to celebrate the festivals, a conflict arose between them."

Epiphanius speaks of them again (*Adv. Haer.*, lib. i. c. 39), and under the title, *Against the Ossenes* (v), as follows :

“ Next follow the Ossenes, who were closely connected with the former sect. They too are Jews, hypocrites in their demeanour, and peculiar people in their conceits.⁵⁵ They originated, according to the tradition which I received, in the regions of Nabatea, Itruria, Moabitis and Antilis, (Ἀρηιλίτις), in the surrounding neighbourhood of the so-called Dead Sea.

. . . The name Ossenes, according to its etymology, signifies *the stout race* (σφιγυρὸν γένος). . . . A certain person named Elxai joined them at the time of the Emperor Trajan, after the advent of the Saviour, who was a false prophet. He wrote a so-called prophetical book, which he pretended to be according to divine wisdom. He had a brother named Jeeus, who also misled people in their manner of life, and caused them to err with his doctrine. A Jew by birth, and professing the Jewish doctrines, he did not live according to the Mosaic law, but introduced quite different things, and misled his own sect. . . . He joined the sect of the Ossenes, of which some remnants are still to be found in the same regions of Nabatea and Perea towards Moabitis. These people are now called *Simseans*.⁵⁶

“ But hear the Sadducee's nonsense (*comp. ibid.*, p. 42) : he rejects the sacrificial and altar services, as repulsive to the Deity, and as things which, according to the meaning of the fathers and the Mosaic law, were never offered to the Lord in a worthy manner. Yet he says that we must pray with our faces to Jerusalem, where the sacrificial altar and the sacrifices have their place. He rejects the eating of animal flesh which is common among the Jews, and other things ; nay, even the sacrificial altar and the sacrificial fire, as being foreign to the

55 This unjust remark about the Essenes, whose exemplary virtues and self-denying life elicited the unqualified admiration of Jews, Greeks, and Romans, is just what might be expected from the bigoted persecutor of heretics, amongst whom he put no less a person than St. Chrysostom.

56 This name may be derived from the Hebrew *Shemesh* (שׁמֶשׁ) *sun*, and was most probably given to the Essenes, because of the erroneous notion that they worshipped the sun.

Deity. The purifying water, he says, is worthy of God, but the fire is unworthy, because of the declaration of the prophet: 'Children, go ye not there to see the fire of the sacrifices, for ye err; yea, it is already an error to think such a thing.' 'If you look at the fire very closely,' says he, 'it is still far off. Moreover, go ye not to look at the sacrificial fire, but go ye rather to the doctrine of the water..' There is much more of such idle talk to be found among the Ossenes."⁵⁷

These are the sources from which writers upon the Essenes have, till within very lately, drawn their information. As to the account of Eusebius (*comp. Hist. Ecclesiast.*, lib. ii, cap. xvii), to which appeal is often made, it is nothing but a Christianized reproduction of the so-called Philonic description of the Therapeutae. It would therefore be useless to give it. In looking through these accounts, it will be seen that there are only three independent ones among them, namely—Philo's, Josephus's and Pliny's; as the notice of Solinus is merely a repetition of Pliny, the description of Porphyry is almost a literal reproduction of Josephus; whilst the distorted scraps of Epiphanius are not only worse than useless, but are unworthy of him, and the account of Eusebius is simply misleading, inasmuch as it is a repetition of an apocryphal story, which has nothing to do with the Essenes.

⁵⁷ This account is worse than useless, inasmuch as it not only gives no information whatever about this interesting order, but is positively

III.

Having given the ancient documents, all that now remains is that I should give a brief sketch of the most important modern literature on the Essenes. In doing this part of my task, as in the former, I shall try as much as it is possible to follow the chronological order.

1513-1577.—Accordingly De Rossi occupies the first position. In his erudite work, called *Meor Enajim*, i.e., *The Light of the Eyes*, which is a Cyclopædia of Biblical literature and criticism, this profound critic gives us a brief notice of this brotherhood, in which he maintains that the Essenes are identical with the Greek sect called *Baithusians* in the Talmud, and *Therapeutæ* by Philo. His account is as follows: "It has often appeared to me strange that the Talmud should say nothing whatever about that sect which obtained a good report among the nations. I therefore examined the works of our sages, to ascertain whether I could find in them any distinction made between the Sadducees and the Baithusians. And it appeared to me that though both alike denied the traditional law (התורה שעל פה), yet the Baithusians are no where charged with the sin of denying, like the Sadducees, the immortality of the soul and future judgment. Moreover, I thought of the similarity of the names Baithusians and Essenes (ביתוסים איסיאי), and especially of the manner in which the ancients changed names. Now, owing to the word בית being so frequently found prefixed to names of schools and families, the appellation ביתוסים might easily have originated from a junction of the words בית איסיאי. I also saw the passage in the Talmud, Sabbath, cap. viii, fol. 108, as quoted also in Sopherim, cap. i, which is as follows:—'A Baithusian

asked R. Joshua whence do we know that phylacteries must not be written upon the skin of an unclean animal? To which he replied—‘It is written that the Lord’s law may be in thy mouth, (Exod. xiii, 9) this signifies that phylacteries must be written upon the skin of an animal which thou canst take into thy mouth, i.e., eat.’ To this he said—‘This being the case, we must also not write the phylacteries upon the skin of an animal which died;’ [for an Israelite is as much forbidden to taste the flesh of it, as to eat an unclean animal.] Hereupon the Rabbi replied—‘I will tell thee a parable, to make the thing clear. Two men are condemned to death: the one the king kills, and the other is killed by the executioner: now, which of the two dost thou esteem higher? Surely the one whom the king himself has executed. So the animal which died, [i.e., which the King of Kings caused to die] must be preferred to the others.’ Whereupon the Baithusian said—‘Accordingly, we ought also to eat it.’ R. Joshua replied—‘The Bible prohibits it (Deut. xiv), and dost thou want to eat it?’ The Baithusian then said—‘קלויס This expression Rashi of blessed memory rightly says is Greek; i.e. *καλόν*.’ Hence it is to be inferred that the Baithusian was a Greek; and, indeed, we know from Philo and Josephus that the Essenes were also Greek Jews, living in Alexandria.

. . . From all these things I easily quieted my mind, and concluded that the Baithusians are the same as the Essenes.’ Now, from a careful perusal of the account given by Josephus of the Essenes, it will be seen that he never describes them as Greek Jews. Besides, this is utterly at variance with ancient tradition, as the Talmudic authorities most positively declare that the Baithusians and Sadducees were both alike in doctrine, that both derived their names from the founder of these sects, Baithos (ביתוס) and Zadok (צדוק), the disciples of Antigonus of

at they gave rise to these sects, through mis-

im, edit. Mantua. 1547, fol. 33 b.

interpreting the following saying of their master² which he had received from Simon the Just :—" Be not like servants who serve their master for the sake of receiving a reward, but be ye like servants who serve their master without the view of receiving a reward," recorded in Aboth. i. 8. Upon this Aboth d. R. Nathan (cap. v.) remarks, "Antigonus' two disciples at first continued implicitly to teach this saying to their disciples, and these again to their disciples. At last, however, they began to ponder over it, and said—'What did our fathers mean by this saying? Is a labourer to labour all day and not receive his wages in the evening? Now if our fathers had believed that there is another world, and a resurrection of the dead, they would not have spoken thus.' Hence they dissented from the law, and from them originated the two sects, the Sadducees and the Baithusians, the Sadducees from Sadok and the Baithusians from Baithus. They used gold and silver vessels all the days of their life, not because they were proud, but because they said that the Pharisees themselves have a tradition that they afflict themselves in this world, and have nothing in the world to come." From this we see that 1. The Baithusians, like the Sadducees, derived their appellation from the proper name of their founder, which is *Baithus* בֵּיתוֹם so that the first part of the name בֵּית cannot be separated from it. 2. Like the Sadducees, the Baithusians denied the immortality of the soul and the existence of angels, whereas the Essenes firmly believed in the immortality of the soul, and made the angels play a very important part in their creed. That the Sadducees and the Baithusians were considered to be identical, or, at all events, to

2 אנטיגנוס איש סוכו קבל משמעון הצדיק הוא היה אומר אל תהיו כעבדים המשמשים את הרב על מנת לקבל פרס אלא היו כעבדים המשמשים את הרב שלא על מנת לקבל פרס והיו מורא שמים עליהם כדי שיהיה שבתם כפול. לעתיד לבא: אנטיגנוס איש סוכו היו לו שני תלמידים שהיו שונין בדבריו שונין היו לתלמידים ותלמידיהם עמדו ודקדקו אחריהן ואמרו מה ראו אבותינו לומר אפשר שיעשה פועל מלאכה כל היום ולא ישול שכר ערבית אלא אילו יודעין אבותינו שיש העולם (אחר) יש תחיית המתים לא היו אומרים כך עמדו ופירשו מי התורה ונשרצו מהם שתי מדרגות צדוקים וביתוסין צדוקים על שום צדוק ביתוסין על שום ביתוס שהיה משתמש בכלי זהב וכלי כסף כל ימיו לא היתה דעתו גסה עליו אלא צדוקים אומרים מסורה בית פורשים שהן מצטיין עצמן בשלם הזה ובעולם הבא אין להם כלום:

hold similar doctrines is also evident from the fact that what is in one place of the Talmud ascribed to the former, is in another place ascribed to the latter. Thus, for instance, in *Succa* 48 b. the Sadducees are said to have questioned the necessity of bringing a libation of water on the Feast of Tabernacles; in *Tosifa Succa* cap. iii. it is ascribed to the Baithusians. In *Maccoth* 5, b. *Chagiga* 16 b. it is said that the Sadducees urged that a false witness should only then be executed if the individual whom he had falsely accused had already been executed; in *Tosifa Sanhedrin*, cap. vi. the same thing is ascribed to the Baithusians. According to *Joma*, 19 b. 53 a., the Sadducees would have it that the High Priest should put the incense on the fire outside the Sanctuary on the great Day of Atonement, in *Tosifa Joma*, cap. i., and *Jerusalem Joma*, i. 5, this is also ascribed to the Baithusians. Comp. also 115, b., *Megillath Taanith*, cap. vi., with *Tosifa Jadajim* cap. ii. And 4. The Baithusians are constantly spoken of as heretics and false witnesses (*comp. Jerusalem Rosh Ha-Shana*, ii, 1; *Babl. ibid.* 226), which is utterly at variance with the high character given to the Essenes even by those who belonged to opposite sects.

1587-1643.—Our learned countryman, Dr. Thomas Godwyn occupies the next position. In his interesting and erudite volume, entitled *Moses and Aaron*: which was first published in London 1625, Godwyn devotes *the twelfth chapter of the first book* to the Essenes. The etymology of this name he takes to be the Syriac *MDN to heal, to cure diseases*, and submits that they were called ESSENES = *ἰατροὶ physicians*, because they cultivated the study of medicine. His summary of their doctrines and practices is made from Josephus' description of them as well as from Philo's reputed account of *the Therapeutae* which has nothing to do with the Palestinian sect. Godwyn also gives a number of reasons in support of his view of the doctrines and practices of the Essenes.

Essenism and Pythagorism. He does not attempt to account for these resemblances, nor does he try to trace the origin of the brotherhood. He is, however, certain that they existed in the time of Judas Maccabæus and "continued until the day of our Saviour and after; for Philo and Josephus speak of them as living in their time." He assigns the following reasons for their not being mentioned in the New Testament. 1. Their being small in number. 2. "They were peaceable and quiet, not opposing any; and therefore not so liable to reproof as the Pharisees and Sadducees, who opposed each other, and both joined against Christ." 3. They were passed over in silence in the New Testament just "as the Rechabites in the Old Testament, of whom there is mention only once and that obliquely, although their order continued about three hundred years, before this testimony was given of them by the Prophet Jeremiah." And 4. "Though the name of the *Essenes* be not found in Scripture, yet we shall find in St. Paul's Epistles many things reproofed, which were taught in the school of the Essenes. Of this nature was that advice given unto Timothy:—'*Drink no longer water, but use a little wine.*' (1 Tim. v. 23). Again, '*Forbidding to marry, and commanding to abstain from meats is a doctrine of devils*' (1 Tim. iv. 3); but especially *Colossians* ii., in many passages the Apostle seemeth directly to point at them, 'Let no man condemn you in meat and drink' (verse 16): 'Let no man bear rule over you, by humbleness of mind and worshipping of angels' (verse 18) 'Why are ye subject to ordinances (*τί δογματίζεσθε* verse 20)?' The Apostle useth the word *δόγματα* which was applied by the Essenes to denote their *ordinances aphorisms* or *constitutions*. In the verse following he gives an instance of some particulars, '*Touch not, taste not, handle not*' (ver. 21). Now the junior company of Essenes might not *touch* the seniors. And in their diet their taste was limited to bread, salt, water

and hyssop. And these ordinances they undertook *διὰ πόθον σοφίας* saith Philo, *for the love of wisdom*; but the Apostle concludeth (ver. 23) that these things had only *λόγον σοφίας* a show of *wisdom*. And whereas Philo termeth the religion of the Essenes by the name of *θεράπεια* which word signifieth *religious worship*; the Apostle termeth in the same verse *εθελεθρεκείαν* *voluntary religious worship* or *will worship*; yea, where he termeth their doctrine *πάτρων φιλοσοφίας* a kind of *philosophy received* from their forefathers by tradition; St. Paul biddeth them beware of *philosophy* (ver. 8).” I have given this extract in full because succeeding writers have with more or less exactness based their opinion upon it. In animadverting upon it, I need only refer to the former part of this Essay, where it will be seen that some of the things here mentioned, are not peculiar to the Essenes, and others do not belong to them at all, whilst the last quotation from Philo describes the *Therapeutae* and not the Essenes.³

1628-1678.—Next in point of time is Theophilus Gale, who gives us a description of the Essenes in his famous work called *The Court of the Gentiles*, part ii. (Oxford, 1671), book ii. § 9, p. 146-156. As might be expected from this learned writer, who wrote this elaborate work to demonstrate that “the original of all human literature, both philology and philosophy, is from the Scriptures and the Jewish Church,” he endeavours to prove that Pythagoras took the whole of his philosophic system from the Essenes. “As for the origination of their name,” Gale tells us, “they were called *ΕΣΣΗΝΑΙ* i.e. according to the Greek *καθαροί* and according to our English dialect *pure*. Now the origination or rise of these Essenes I conceive (by the best conjectures I can make from antiquity), to be in or immediately after the Babylonian captivity (though some make them later), and the occasion of their separation

³ 1 Cor.
An.

and Aaron: Civil and Ecclesiastical Rites used by the
th edition (London, 1672), book i, chap. xii, p. 50-59.

and consociation seems this. Many of the carnal Jews defiling themselves either by being too deeply plunged in worldly affairs, even to the neglect of their religion, or, which was worse, by sensual compliances with their idolatrous lords, thereby to secure their carnal interests, these **אִסְרִי** or Essenes, to preserve themselves from these common pollutions, separated and retired themselves from the crowd of worldly affairs into an holy solitude, and private condition of life; where they entered into a strict confederation or consociation to lead together a collegiate devout life."⁴ He then gives an epitome of their doctrines and practices, and finally endeavours to shews that Pythagoras got his system from them. In doing this, Gale mixes up the Therapeutae with the Essenes, and follows largely the description of Godwyn.

1643-1724.—We then come to Dean Prideaux, who has a lengthy description of the Essenes in *The Old and New Testaments Connected*, part ii. book v., which first appeared in London, 1717. The chief value of Prideaux's work on this subject consists in the fact, that he has given in English Philo and Josephus on the Essenes, as well as the short notice from Pliny. In his own remarks, which follow these extracts, he, in common with his predecessors, mixes up the Therapeutae with the Essenes, and tries to repel the Romanists who adopted the assertion of Eusebius (*Hist. Ecclesiast. lib. ii. c. 17*), that these Therapeutae or contemplative Essenes were Christian monks instituted by St. Mark. He also endeavours to expose the folly of the Deists, who infer, from the agreement between the Christian religion and the documents of the Essenes, that Christ and his followers were no other than a sect branched out from that of the Essenes. Among the accusations which the Dean brings against the Essenes for violating the law of God, is the charge that they "absolutely condemned servitude which the holy Scriptures of the

⁴ The Court of the Gentiles. Pt. ii of "Philosophy," Oxford, 1671, p. 147, &c.

New Testament (Philemon 9-21), as well as the Old, allow."⁵ Instead of blaming them for repudiating slavery, we believe that the civilized world in the present day will be unanimous in pronouncing it to have been one of the glorious features of Essenism, anticipating the spirit of Christianity and the philanthropy of the nineteenth century.

1653-1723.—Basnage gives a very lengthy account of the Essenes in his *History of the Jews lib. ii. chaps. xii. xiii.* Those who are acquainted with the writings of this learned Frenchman, know that he could not write on anything without bringing together a mass of useful information. He, however, mistook the character of the Essenes, as well as the value of the documents upon which he relies. Preferring Philo's account to that of Josephus, though the latter lived amongst the Essenes, Basnage confounds the brotherhood with the Therapeutae, and hence asserts that "they borrowed several superstitions from the Egyptians, among whom they retired." Through this, he is led to occupy by far the greater part of his description with the needless discussion of the question "Whether the Essenes from being Jews were converted to Christianity by St. Mark, and founded a monastic life."⁶

1692-1762.—Dr. Jennings' chapter on the Essenes is simply a commentary on Godwyn's account. Jennings disputes some of the imaginary parallels between Essenism and Pythagorism exhibited by Godwyn, and inclines to the opinion "that the Essenes begun a little before the time of the Maccabees, when the faithful Jews were forced to fly from the cruel persecutions of their enemies into deserts and caves, and by living in those retreats, many of them being habituated to retirement, which thereby became most agreeable to them, they chose to continue it, even when they might have appeared upon the public

⁵ The Old and New Testaments Connected, seventeenth editions, vol iii. London, 1815, part ii, book v, p. 406—431.

⁶ The History of the Jews, from Jesus Christ to the present day. London, 1708, p. 125—137.

stage again, and accordingly formed themselves into recluses." As to the difficulty to account for "the absolute silence of the evangelical history concerning the Essenes," Jennings reiterates the remarks of Godwyn upon the subject.⁷

In 1821, appeared in Berlin, Bellermann's valuable little volume on the Essenes and Therapeutae.⁸ The author with characteristic German industry and perseverance, brought together in this monograph the ancient documents on the Essenes. His critical acumen, however, is not commensurate to his industry, and while his little volume will deservedly continue to be a useful manual for the student who wishes to acquaint himself with what Philo, Pliny, Josephus, Solinus, Porphyry, Epiphanius and Eusebius said upon this subject, it is to be questioned whether Bellermann's conclusions will be shared by many. He is of opinion that "the Essenes and Baithusians are the same both in name and doctrine," and that "the Essenes have four other names in history besides their proper name, viz. :—they are called, 1, *Therapeutae* by the Greek Alexandrians. 2. *Hiketeans* by Philo, in the superscription to the Treatise on contemplative life. 3. *Ossenes* or *Ossens*, by Epiphanius. And 4, *Baithusians* in the Talmud, and by several Rabbins. As this notion, which has been advanced by De Rossi three centuries and a half ago, has already been refuted, it would be needless to repeat the arguments here.

1825.—Neander, whose first instalment of his gigantic Church History appeared in 1825, now began to grapple with this mysterious brotherhood. In the introductory chapter of this history, in which a description is given of the religious condition of the world at the advent of Christ, he gives a very

⁷ Jewish Antiquities ; or a Course of Lectures on the two first books of Godwyn's *Moses and Aaron*, ninth edition. London, 1837, book i., chap. xii, p. 281—287.

⁸ *Geschichtliche Nachrichten aus dem Alterthume über Essäer und Therapeuten*. Berlin, 1821.

brief but very pregnant sketch of the Essenes. With that deep penetration, which was one of the chief characteristics of this sagacious critic, he repudiates the notion that the Essenes originated under foreign influences, and maintains that "it is a gross error to infer from the resemblance of certain religious phenomena the relationship of which is to be traced to a common inward cause, inherent in the nature of the human mind, that they have an external origin, having been copied from the other." Hence, he submits that Essenism arose out of the deeper religious meaning of the Old Testament, that it afterwards adopted some of the old Oriental, Parsee, and Chaldean notions, and that it had no Alexandrian elements. Neander moreover most justly cautions against the accounts of Philo and Josephus, saying that they clothed the opinions of the Essenes in a garb peculiarly Grecian, which we might rightly consider as not originally belonging to them.⁹

1829.—The difficulty which perplexed Christian writers, arising from the fact that the Essenes are not mentioned in the New Testament, did not affect Jewish writers, although it is true that this name is also not to be found in the ancient Jewish writings. For if it be granted that this appellation is a corruption of an Aramaic word, the Essenes must be looked for in the Talmud and Midrashim, which are chiefly written in Aramaic, under their original designation whatever that might be. The clue to it must, of course, be the identity of the features ascribed to them by Philo and Josephus and those ascribed in the ancient Jewish volumes to any order of Judaism. To this task Rappaport, the corypheus of Jewish critics, betook himself. Knowing that the Essenes were no distinct sect, in the strict sense of the word, but simply an order of Judaism, and that there never was a rupture between them and the rest of the Jewish community, Rappaport most

⁹ General
Clark's T

Christian Religion and Church, English Translation,
vol. i, Edinburgh, 1851, p. 58—66.

justly does not expect that they would be spoken of under a fixed denominational name. He therefore rejects De Rossi's notion that the Baithusians, so frequently denounced in the Talmud and Midrashim, are the Essenes described by Philo and Josephus, and sought to identify them by their peculiar practices, expecting to find that they would be spoken of by different names. He soon found that what Philo and Josephus describe as peculiarities of the Essenes tallies with what the Mishna, the Talmud, and the Midrashim record of the *Chassidim* (חסידים), and that they are most probably the so-called *old believers* (ותיקין), who are also described in the Talmud as *the holy community in Jerusalem* (קהל קדישא דבירושלים). He rightly recognised in them an intensified form of Pharisaism, and remarks that what is said in the Mishna about the moderation observed in eating and drinking, the great humility, endurance under sufferings, zeal for everything that is holy, community of goods, &c., refers to this holy community, or the Essenes. He also quotes the following remark from the Midrash Coheleth, on Eccles. ix, 9, about this holy community; "Rabi repeated from the traditions of the holy community (עדה קדושה) 'acquire a trade in connection with the study of the Scriptures, &c.'—[Query] 'Why are they called holy community?' [Reply] 'Because they divided the day into three divisions—devoting one-third to the study of the Scriptures, another to prayer, and the third to work. Some say that they devoted the whole of the winter to studying the Scriptures and the summer to work.'" He, too, was the first who pointed out that the prayer which Josephus tells us the Essenes offered up at the rising of the sun, is the national hymn of praise, which still constitutes a part of the Jewish daily service, and is as follows:—

He in mercy causes His light to shine upon the earth and upon the inhabitants thereof; and in His goodness unfailingly renews every day the work of creation. How numerous are Thy works, O Lord! Thou hast made them all in wisdom; the earth is full of Thy possessions.

O King, Thou only art the exalted one from everlasting, the praised and glorified and extolled since the days of yore! Lord of the universe, in Thy great mercy have mercy upon us! Lord our might, fortress of our strength, shield of our salvation, defend us! O Lord, be Thou praised, Thou great in wisdom, who hast ordained and created the rays of the sun: the Infinitely Good has formed a glorious testimony for His name. He surrounded His majesty with luminaries. The chiefs of His heavenly hosts are holy beings; they glorify the Almighty; they continually declare the glory of God and his holiness. Blessed be the Lord our God, for the excellency of the works of Thy hands, and for the shining luminaries which Thou hast. They shall glorify Thee for ever.

God, the Lord of all created things, is praised and blessed in the mouths of all the living. His power and goodness fill the universe; wisdom and intelligence are round about Him. He exalts himself above the angels, and beams in glory upon his chariot-throne. Interceding goodness and rectitude are before His throne, loving-kindness and mercy before his majesty. Benign are the luminaries which our God has created. He has formed them in wisdom, intelligence, and understanding; He has endowed them with power and strength, to bear rule in the midst of the world. Filled with splendour and brightness, their glory illuminates all the world; rejoicing in rising and joyous in setting they perform with awe the will of their Creator. They give praise and glory to His name, joy and song to the memory of His kingdom. He called the sun, and light rose; He saw and shaped the form of the moon. Praise Him all ye heavenly hosts; ascribe glory and majesty to Him ye seraphim, ophanim, and holy angels.

These, as Rappaport rightly remarks, are some of the remains of the ancient prayer used by the Essenes. It will be seen that these hymns of praise contain not only thanksgiving for the renewal of the light, to which Josephus refers, but they also refer to the mysterious cosmogony (מעשה בראשית) and theosophy (מעשה מרכבה), as well as to the angels which played such an important part among this brotherhood.¹⁰

1835.—The difficulty of reading Rabbinical Hebrew in which Rappaport's profound remarks are written, must have prevented Gfrörer from seeing what this erudite Jewish critic had written on the Essenes; for, although the second edition of vol. i. part 11 of his *Critical History of Primitive Christianity*, containing an account of the Essenes, appeared in 1835, yet he positively states "that the Essenes and the Therapeutae are the same sect and hold the same views" (p.299).

¹⁰ 18

Hebrew Annual, entitled *Bikure Ha-Ittim*, vol. x, Vienna,

According to him, the development of Essenism is as follows. In the third century before Christ, the Jews in Alexandria formed societies according to the Pythagorean model, and thus originated the sect called the Therapeutae, from these Egyptian Therapeutae again Essenism developed itself in Palestine about 130 B.C. Hence Essenism is the channel through which the Alexandrian theosophy was first transplanted into Palestinian soil. The reason why the Essenes kept their doctrines secret is that the Palestinian priests were hostile to this foreign importation, and persecuted those who received this contraband. Accordingly, the relationship of Pythagorism, Therapeutism and Essenism, to use Gfrörer's own figure, is that of grandmother, mother and daughter. "So perfect is the agreement between the Therapeutae and the Essenes, that it even extends to their names. For the word 'Essaîns', according to the most correct etymology, is derived from the Syro-Chaldaic verb **NDN** which denotes *to cure, to nurse*, and hence is nothing but a literal translation of *θεραπευτής*."¹¹

1843.—Similar in spirit is the elaborate article on the Essenes in *Ersch und Gruber's Cyclopædia*, written by Dähne, who maintains that "Essenism is the produce of the Jewish-Alexandrian philosophy, and that it is only when viewed from this stand-point that the deviations from the rest of their Jewish co-religionists, and their peculiar institutions, doctrines, and precepts appear in the clearest light." It is not surprising that holding such an opinion Dähne should feel perplexed to account for the existence of this thoroughly Jewish-Alexandrian order, as he makes the Essenes to be, in the very heart of Palestine. All that he can say upon this subject is, that they somehow got there in the middle of the second century before Christ. The affiliation of Essenism to the Jewish-

¹¹ Comp. *Kritische Geschichte des Urchristenthums*. 1 Theil Philo und die jüdisch-alexandrianische Theosophie, 11 Abtheilung. Stuttgart, 1835. p. 299-356.

Alexandrian philosophy brings it into most intimate relationship with Therapeutism, and necessarily devolves upon Dähne to define this family connection which he does in the following manner.¹² The difference between the Therapeutae and the Essenes, both of whom are followers of the Jewish-Alexandrian moral philosophy, is that the former devoted themselves entirely to a contemplative life, whilst the latter gave themselves more especially to a practical life. Hence though both rest upon the same foundation, the Therapeutae gave themselves up absolutely to the highest aim of man, as they marked it out, the contemplation of God; whilst the Essenes to some extent voluntarily lingered in the outer court of the Holy of Holies, placed themselves intentionally for the good of the brethren in more frequent contact with the world than the requirements of nature demanded, thereby generously, but certainly unphilosophically, temporarily retarding their own highest perfection and happiness." Like De Rossi, Bellermand, Gfrörer and others, Dähne derives the name from the Chaldee *NDN* to heal, and says "accordingly the term Essenes denotes *spiritual physicians*, or men who strive in the highest sense to lead back the spirit to its natural (i.e. truly divine) character and activity."¹³

1848.—A new epoch began in the history of the Essenes with the investigation of Frankel on this subject, which

12 Diese Trennung nun aber unter den Anhängern der jüdisch-alexandrinischen Religionsphilosophie selbst in solche, welche sich ausschliesslich dem beschauflichen und in Andere, welche sich vorzugsweise dem praktischen Leben widmeten, ist es eben, welche sich in unserem fraglichen Doppelorden auch äusserlich repräsentirte, sodass, wenn schon beide ganz auf derselben philosophischen Unterlage ruhten, die Therapeuten sich möglichst ausschliesslich und unmittelbar dem höchsten von ihnen angestrebten menschlichen Lebensziele, der Anschauung und die Essäer gewissermassen freiwillig in dem Irdischen, sich absichtlich und zum Besten der Brüder in dem Sinnlichen, als es die Naturnothwendigkeit, höchste Vollkommenheit und Seligkeit zwar unphilosophisch genug augenblicklich noch

appeared in his *Zeitschrift für die religiösen Interesse des Judenthums*, 1846. Taking up the idea of Rappaport, that the Essenes must be looked for in the body of the Jews and not as a separate sect, Frankel refers to the fact that, whilst the *Assideans* = *Chassidim* are referred to in 1 Macc. ii. 24; 2 Macc. xiv. 6, &c., the *Perushim* = *Pharisees* are never mentioned, to show that no such marked and denominational divisions existed at first in the community, and rightly remarks, that it "is only after a longer development that sects appear in their separation, and sharply defined features, when that which originally formed a united whole is now divided and parted into various branches. And even this partition and separation only shew themselves to the analysing mind, and especially when the analysis is conducted after a foreign fashion, as Josephus has done it, who reduced the Jewish sects into Greek schools, and made the Essenes correspond to the Pythagoreans. But in reality even these divisions flow one into another, and do not stand in opposition to one another, but are simply to be distinguished by their different shades of colour, and by the greater stringency or laxity with which the same rules are regarded, so that they do not form separate sects, but some individuals keep to these rules with greater anxiety, whilst others, though considering them as binding, do not regard them as having such a wide application. Now in early times there were only *Essenes* = *Chassidim* (חסידים), the name of *Perush* = *Pharisee* (פרוּשׁ) was not as yet known; it was only afterwards when in succeeding periods some became more rigid in their manner of life and views of religion, that the name *Pharisees* (פרוּשִׁים) appears to denote the less strict Jews, whilst the others were in a special degree denominated by the old, respectable appellation *Chassidim* = *Essenes* (חסידים)." This, Frankel corroborates by showing most clearly that many of the vital principles which Josephus describes as peculiar to Essenism, are at the very basis of

Phariseism, and that the Essenes are frequently mentioned in the Mishna, Talmud, and Midrashim by the names חסידים *the original Assideans = Chassidim*, חברים *the associates*, חכמים *those who have enfeebled their bodies through much study*; נזירים *the retired ones*; קהילת צדק *the holy congregation in Jerusalem*; חכמי ירושלים *hemerobaptists*. Frankel concluded his essay with the promise to return to this subject on some future occasion.¹⁴

1847.—Within twelve months of the publication of Frankel's elaborate Essay, an article appeared in the American Quarterly entitled *The Biblical Repository*. As there was not sufficient time for this German production to become known in the New World, Mr. Hall, the writer of the article, could not avail himself of it, and was therefore obliged to derive his information from the writings of Dr. Neander. But though Mr. Hall has thrown no light on the Essenes, yet his reflections upon their moral character and their connection with Christianity are so just, sensible and candid, that we subjoin them to show that good Christians may honestly acknowledge the good in Essenism without detracting from Christianity.

"Let us give the Essene credit for all that he was as a worshipper of the true God, and as a man striving after moral purity in a corrupt age. The Gospel that breathed new life into the higher nature of man, can afford to allow all his virtues. We know that the Spirit of Christ opens the eye to the excellencies of others. Truth rejoices in truth, and as all truth is from the same source, the lustre of one development can never be increased by hiding the glory of another. We would not enhance the necessity of our Lord's appearance by depreciating the moral condition of mankind at that period. Those ascetic Jews deserve well of mankind for the light they gave out in a dark age. We admire the humanity and justice of their principles; their disapproval of war and slavery in the midst of a world lying in wickedness, and the noble example of industry, frugality and moderation in the things of this life they set before all. We honour their honest endeavours to combine the *vita contemplativa* and the *vita activa*,—to escape the bondage of the senses, to maintain the supremacy of the spirit, and to unite themselves with the Highest. But in all these respects, they are only the true children of monotheism, the legitimate offspring of the Jewish theocracy. They could have nowhere else. In the phenomenon of the Essenes let us

Frankel, Zeitschrift für die religiösen Interessen des Judenthums, 1846, p. 441-461.

therefore adore the provident wisdom of Jehovah, and recognize the secret working of his love in carrying forward the great, eternal economy of salvation. They exerted an influence on their age which helped to pave the way for the Christ. Conscience spoke, and was spoken to, through them; and the dying sense of virtue was kept alive. Thus were they stars which emitted an humble though useful light before, but grew pale and became invisible after, the coming of the Sun of Righteousness." ¹⁵

1852.—Though Ewald published the second edition of the fourth volume of his Jewish History in 1852, when Frankel's Essay had been six years before the literary world, yet he manifests total ignorance of it in his account of the Essenes, contained in this volume. Still, this profound and merciless critic, without having access to the Jewish information gathered from the Talmud and Midrashim, saw that Essenism was no Greek plant transplanted into Palestine, but like Pharisaism grew out of the Chassidim. He remarks that "people, who left the great community in order to lead a specially holy life, with the permission and under the direction of the law, were to be found in Israel from the remotest times, yet in its first form there were only the Nazarites, of whom each one lived for himself; and in the second, the Rechabites combined themselves already into a larger union; but now the whole conscience of the people itself, as it were, departed into solitude with numerous Essenes. For it cannot be denied that they, proceeding from the Chassidim, represent the direct and legitimate development of Judaism in the form which became the ruling one since Ezra." "Their new features and endeavours merely consisted in their intensely earnest and rigorous application of the demands of the law, as understood and interpreted since Ezra. Finding that the rigorous and logical application of these laws was impossible in the great community, especially in that community as regulated by the Pharisees, they preferred to congregate and

¹⁵ Comp. The Biblical Repository and Classical Review. New York, 1847, p. 162-173.

live in solitude." ¹⁶ Very unfortunate is Ewald's derivation of Essene from the Rabbinic שֶׁפָּרַט *servant* (of God), and the assertion that this name was given to them because it was their only desire to be θεράπευται θεού.

1853.—Nearly seven years had now elapsed since Frankel published his masterly Essay on the Essenes, and promised to return to this subject at some future time. True to his promise, he now gave another elaborate treatise, in which he substantiated, by numerous quotations from the Talmud, his former conclusions, that the Essenes are the offspring of Judaism, that they are nothing but stationary, or more correctly speaking consequential Chassidim, that they were therefore not so far distant from the Pharisees as to be regarded as a separate sect, but, on the contrary, that they formed a branch of Pharisaism.¹⁷

1856.—So convincing was Frankel's Treatise, that Graetz, who published the third volume of his masterly History of the Jews in 1856, in which he gives an elaborate account of this brotherhood, remarks: ¹⁸ "I completely accept these results about this sect being based upon critical investigation, and shall only add a few supplementary points by way of illustration." ¹⁹ The additions consist of a very able analysis of Philo's reputed Treatise entitled *De Vita Contemplativa*, showing that it is spurious, and of an attempt to show that the Essenes were *perpetual Nazarites* (נְזִירֵי עוֹלָם). His remarks are as follow—"There were great masses of Nazarites in the

¹⁶ Geschichte des Volkes Israel, Vierter Band. Göttingen, 1852, p. 419–428.

¹⁷ Comp. Monatschrift für Geschichte und Wissenschaft des Judenthums, Zweiter Jahrgang. Leipzig, 1853, p. 30–40; 61–73.

¹⁸ Ich nehme diese auf kritischer Forschung, beruhenden Resultate über diese Secte vollständig an und werde nur noch einige Punkte nachträglich beleuchten.

¹⁹ Die Eigenthümlichkeiten der Essäer lassen sich nicht genügend aus dem Wesen der im Talmud vorkommenden נְזִירִים oder נְזִירִיּוֹת und der in der Makkabäerzeit auftretenden „Assidäer“ erklären; man muss auch auf das nasiräische Wesen Rücksicht nehmen. Nasiräer gab es in der nachexilischen Zeit eine grosse Menge (*Tosifia Nasir* c. iv. *Babli Berachot* 48 a. 1 *Makkub.* ii, 49. *Jos. Alterth.* xviii, 6, 1). Aber sie trugen zugleich einen andern Charakter, als

post-exile period (*Tosifta Nasir*, c. iv.; *Babbi Berachoth*, 48 a; 1 *Macc.* ii. 49; *Joseph. Antiq.* xviii. vi.), but they were of a different character to those of the Biblical period; they were *Nazarites for the whole life* (*Nasir* 4 a.) The Mishna presupposed their existence; the magical in Naziritism, which was connected with the growing of the hair in the Nazarites of the Bible, gradually recedes into the back ground or loses its significance altogether; whereas the Levitical, the guarding against defilement, appears more and more in the foreground among the life long Nazarites. The Essenes then were such Nazarites as represented in private life the highest priestly consecration. The connection between the Nazarites and Essenes has already been indicated in obscure passages in the Talmud, that one consecrated himself to be a perpetual Nazarite if he simply wished to be a Nazarite in order that he

die der biblischen Zeit: sie waren Nasiräer fürs ganze Leben נזיר עלם (*Nasir* 4 a). Die Mischna setzt das Vorhandensein solcher ohne Weiteres voraus, und das Magische an dem Nasiräerthum, das sich bei den biblischen Nasiräern an den Haarwuchs knüpfte, tritt immer mehr zurück, oder hat vielmehr gar keine Bedeutung mehr. נזיר עלם הנזיר שצו מיקל בשער (das). Hingegen tritt bei den lebenslänglichen Nasiräern das Levitische, die Hut vor Verunreinigung, immer mehr in den Vordergrund (das.) Die Essäer werden also solche Nasiräer gewesen sein, welche in ihrem Privatleben die höchste priesterliche Weihe darstellen wollten. Den Zusammenhang zwischen Nasiräern und Essäern deutet schon eine dunkle talmudische Stelle an, dass Jemand sich dadurch schon dem vollständigen Nasireat weihet, wenn er auch nur insofern Nasiräer sein will, um die Geheimnisse entehrender Familienverhältnisse bewahren zu können: דרני נזיר אם לא מלה כשפוח דרי וז נזיר ולא ילה כשפוח (*Tosifta Nasir* c. 1 b *Kiduschim* 71 a). Die Erklärung dieser Stelle durch den Essenismus hat schon Edeles (מדרשיו) in seinem Agadacommentar z. St. geahnt. Diesen Zusammenhang zwischen Nasiräerthum und Essenismus haben Epiphanius und die arabischen Schriftsteller Makrisi und Abulfarag' geahnt; wenn auch Epiphanius die Ναζαπαῖοι von den Ὀσσηνοί unterscheidet, so sind die Eigenheiten, die er von den Erstern berichtet, doch ganz essäisch. Ebenso hat Makrisi die Essäer in drei Secten zerspalten, in die Täufer (מנפוחין=ἡμεροβαπτισται), die Essäer (אסאנין) und in die Nasiräer (מנחשטין) (in *de Sacy Chrestomathie Arabe* Ausgabe von 1806, arabischer Theil 172 und tome ii, 218). Das arabische Makkabäerbuch bezeichnet die Essäer durch Chassidäer (c. xxv); in Josippon fehlen an der Stelle, wo er von den drei Secten spricht, gerade die Essäer (iv, 6, Breithaupt) Die Identität von Nasiräern, Essäern und Assidäern wird also von vielen Seiten bestätigt. Auch aus Josephus' Angabe, die Essäer hätten eigne Bücher gehabt (jüd. Kr. ii, 8, 7), lässt sich ihre Identität mit den Assidäern erweisen. Im Talmud (Jeruschalmi Barachot, Ende) wird aus einem Buche der Chassidäer der Satz mitgetheilt: „Verlässt du sie einen Tag, so verlässt sie dich zwei Tage“ : כחוב בספר חסידים אם חסבה יום ימים חסוב

might be able to preserve the secrets of disgraceful family circumstances. (*Tosifta Nasir*, b. i. 6 ; *Kidushim* 71 a.)²⁰

1857.—The learned historian Jost, who published the first volume of his History of Judaism in 1857, was also perfectly convinced by the results of Frankel's researches, and made them the basis of his excellent description of the Essenes, in which he maintains that they grew out of Pharisaism or from the ancient *Chassidim*. "The Essenes," he submits, "are exactly the same that the other Rabbis wished to be who endeavoured to practise the Levitical law of purity, as leading to higher consecration. They have neither another creed nor another law, but simply institutions peculiar to this brotherhood, and endeavour to reach the highest consecration by their manner of life, in defining the different stages, according to preliminary exercises and certain years of preparation. Their views and tenets are therefore also to be found in the utterances of the learned and the Rabbis who did not enter their order, so that they did not look upon the Essenes as opponents or apostates, but, on the contrary, as holding the same opinions with increased claims and some fewer enjoyments, whom many out of their own midst joined, and who were called *Chassidim* or *Zenuim*."²¹

1857.—The comparatively few and unessential deviations from Judaism to be found in Essenism were, however, more than Herzfeld could tolerate, without characterising the innovators as heretics and smugglers of contraband opinions. Dissatisfied with the modern researches of Frankel and Graetz on this subject, this learned historian, and chief Rabbi of Brunswick, returned to the old notion of De Rossi, that the Essenes of Josephus and Philo are identical with the Baithusians mentioned in the Talmud. Still he thinks that De Rossi's

²⁰ Geschichte der Juden, vol. iv. Leipzig, 1856, p. 96-106 ; 518-528.

des Judenthums und seiner Secten, vol. I. Leipzig, 1857,

opinion "must be better proved than he had done it," and therefore remarks—"first of all, seeing that the prefixed **בֵּית** denotes school or sect in the appellations Beth-Shammai, Beth-Hillel; that **בֵּית הַכּוֹתִים** in Tosifta Helem ii. b, and **בֵּית כּוֹתִאי** in Chullin 6 a, denotes *the sect* or *the land* of Cuttim; and then that **בֵּית סֵן** stands twice Tosifta Succa, cap. iii., and Tosifta Menachoth cap. x. for Baithusians, can it mean anything else than *house* or *sect of Essenes*? When **רֹאשׁ** *physician* became the name of a sect, an Essene could not so well be called **רֹאשׁ** without ambiguity; he was therefore described as one of **בֵּית רֹאשׁ**." ²² Thus much for the origin of the name, and now let us hear Dr. Herzfeld's theory about the brotherhood itself. It is simply this²³—"A Jew, who became acquainted with the allegorical exegesis prevalent among the Alexandrian Jews, and with its mother the Greek wisdom, but who, like Pythagoras, Plato and Herodotus, had also found

22 Die Essäer waren die Baitusim, wie schon R. Asarja de' Rossi vermuthet hat; es muss dies nur besser begründet werden, als von ihm geschehen ist. Ich bemerke zu dem Ende erstens, dass wie das vorgesetzte **בֵּית** auch in den Benennungen Bet-Schammaj, Bet-Hillel Schule oder Fraction bedeutet, so *Tosifta Kelim* ii, 6 **בֵּית הַכּוֹתִים**, *Chulin* 6, a **בֵּית כּוֹתִאי** für die Sekte oder das Land der Cutim vorkommt; sodann dass *Tosifta Succa*, K. iii zweimal und *Tosifta Menachot* K. x. für Baitusim **בֵּית סֵן** steht: kann dies wohl etwas Anderes als Haus, Sekte der Essener bedeuten? Als **רֹאשׁ** (Arzt) Sektename wurde, konnte man den Essäer nicht gut mehr schlechthin **רֹאשׁ** nennen, ohne undeutlich zu werden, man umschrieb ihn daher wohl als Einen vom **בֵּית רֹאשׁ**, bildete danach auch mit Zugrundelegung der Form Essener, das nachgewiesene **בֵּית סֵן**, und zog dann Jenes zusammen, um den einzelnen Essäer zu bezeichnen, gab aber dieser Form den u-Laut, entweder nachdem man das syrische Wort **רֹאשׁ** zuweilen nach syrischer Weise *ósseh*, also dunkel ausgesprochen hatte, woher die Aussprache Ossener bei Epiphanius herrühren mag, oder was mir noch wahrscheinlicher ist, indem man dem Worte Peruschim conform Zedukim und Baitusim bildete.

23 Nach allem diesen scheint es, dass ein Jude, welcher mit der unter den alexandrinischen Juden aufblühenden allegorischen Exegese und mit deren Erzeugerin, der griechischen Weisheit, bekannt geworden war, daneben aber auch Gelegenheit gefunden hatte, von ägyptischen Priestern Manches zu lernen, wie Pythagoras selbst, Platon und Herodot, den Plan gefasst und ausgeführt habe, eklektisch hieraus und aus dem Judenthume ein speculatives und asketisches System sowie nach demselben aus judäischen Asketen eine Sekte zu bilden. Dass es an Solchen nicht gefehlt habe, verbürgt das Vorkommen von Nasiräern, z. B. nach *Tosifta Nasir* K. iv unter Schimon dem Gerechten, ferner I Mack. iii, 49, und von ihrer 300 auf einmal unter Schimon ben Schatach nach *Nasir jer.* v, 3. Dass er aber nicht mit jüdischen Asketen in Aegypten diesen Versuch machte, geschah vielleicht, weil es damals dort noch an solchen Asketen fehlte, oder weil er selbst aus Judäa gebürtig sein mochte.

an opportunity to learn some things from Egyptian priests, conceived and carried out the plan, eclectically to form from it and from Judaism a speculative and ascetic system, as well as to organise, according to its model, a sect from the Jewish ascetics." ²⁴ This Alexandrianized Palestinian Jew founded the order of the Essenes in Palestine about 230 B.C.

1857.—Another effort was made in this year to explain the origin of this mysterious brotherhood. Professor Hilgenfeld of Jena, who maintains their genuine Jewish origin, starts the notion that the Essenes belonged to the Apocalytical school, and that they must be regarded as the successors of the ancient prophets, and as constituting the prophetic school. It is only when we view them from this stand point that their precepts and practices can be understood, and that the high antiquity ascribed to them by Josephus (*Antiq.* xviii. 1, 2) and Pliny (*Hist. Nat.* v. 17), can be comprehended. This he moreover assures us gives the clue to the explanation of their name. The Hebrew prophets were also called *נביאים* *seers*, which, being in the Aramaic pronunciation *נְבִיִּים*, easily gave rise through Greek change of vowels to the name *Ἐσσαίων*, *Ἐσσηνοί*. Hilgenfeld manifests an almost inexcusable ignorance of the labours of Frankel and Graetz on the Essenes. ²⁵

1860.—A necessarily brief but interesting article on the Essenes, written by the able Mr. Westcott, appeared in Smith's Dictionary of the Bible. The writer wisely availed himself of the labours of Frankel and Jost, and properly traced the origin of the brotherhood to the Chassidim. His fear, however, lest any shining virtues in the Essenes might be thought by some to pale some of the brightness of the Sun of Righteousness, prevented him from appreciating the true

²⁴ Geschichte des Volkes Israel von Vollendung des Zweiten Tempels bis zur Einsetzung des Mackabäers Schimon zum hohen Priester und Fürsten, Zweiter Band. Nordhausen, 1857, p. 368–377 ; 387–409.

²⁵ Die jüdische Apokalyptik in ihrer geschichtlichen Entwicklung. Jena, 1857, p. 245–278.

character of this order, as well as from seeing that they paved the way to Christianity.

1863.—Graetz again, in the second edition of the third volume of his *History of the Jews*, in which he has an additional chapter on the Rise and Progress of Christianity, goes to the other extreme, and maintains that Jesus simply appropriated to himself the essential features of Essenism,"¹⁶ and that primitive Christianity was nothing but an offshoot from Essenism.

1862.—Of the article on the Essenes in Dr. Alexander's valuable edition of *Kitto's Cyclopædia of Biblical Literature*, being written by me, I can do no more than say that it embodies the substance of this Essay.

1863.—The description of the Essenes in the new edition of Dean Milman's *History of the Jews*, gives a very imperfect idea both of the development and morality of this brotherhood.

Before the meeting separated, the President announced that he had a communication to make, which was that he was under the necessity of resigning the chair of the society which he had held for the past year, as he had made arrangements to leave this country to reside at Heidelberg. He thanked the society for the honour they had done him, and for their individual kindness, and expressed his regret at parting from his friends, assuring them, however, that he should still continue his interest and his contributions to the society.

Dr. COMMINS proposed a vote of thanks to the President, and expressed the great regret of the society at his coming departure, and their best wishes for his future prospects.

Dr. EDWARDS seconded the motion, which was carried by acclamation.

Dr. Ihne having suitably acknowledged the resolution, quitted the chair, and the society adjourned until October next.

¹⁶ *Geschichte der Juden*, Dritter Band Zweite Auflage. Leipzig, 1863, p. 216-252.

ADDITIONS TO THE LIBRARY.

Entered from May 1862 to May 1863

| | Edn. | Owner |
|---|------|---------------------|
| 1862. | | |
| SEPTEMBER 6th. | | |
| Proceedings of the Society of Antiquaries, vol. 1. | | |
| Nos. 4, 5, 6, 7 | | The Society. |
| Proceedings of Geologists' Association, Nos. 1—6 | | |
| | | The Association. |
| Transactions of the Tyneside Naturalists' Field | | |
| Club, vol. 5, part 3 | | The Club. |
| Proceedings of the Literary and Philosophical | | |
| Society of Manchester, vol. 2 | | The Society. |
| Memoirs of the Literary and Philosophical Society | | |
| of Manchester, 3rd series, vol. 1 | | The Society. |
| Journal of the Statistical Society, June and Sep- | | |
| tember, 1862 | | The Society. |
| Journal of the Royal Dublin Society, Nos. 24 | | |
| and 25 | | The Society. |
| Proceedings of the Royal Society, Nos. 49, 50, 51 | | The Society. |
| Silliman's American Journal, May and July, 1862 | | B. Silliman. |
| Journal of the Franklin Institute, Nos. 436—441 | | The Institute. |
| Quarterly Journal of the Geological Society. | | |
| Nos. 69 and 70 | | The Society. |
| Journal of the Linnean Society, No. 23 | | The Society. |
| Quarterly Reports of the Meteorological Society of | | |
| Scotland, December, 1861, and March, 1862 | | The Society. |
| Canadian Journal of Industry, Nos. 38—40 | | Canadian Institute. |
| Report of Plymouth Institution, 1861—62 | | The Institution. |
| OCTOBER 20th. | | |
| Greenwich Observations, 1860 | | The Admiralty. |
| Errors in Hansen's Lunar Tables | | The Admiralty. |
| of the Royal Geographical Society, vol. 31 | | The Society. |

| Title. | Donor. |
|---|----------------------------|
| Journal of the Royal Asiatic Society, vol. 19, pt. 4 | <i>The Society.</i> |
| Monthly Notices of Royal Astronomical Society, Nos. 5, 6, 7, 8 | <i>The Society.</i> |
| Proceedings of the Royal Geographical Society, vol. 6, Nos. 2—4 | <i>The Society.</i> |
| Annual Report of the Royal Cornwall Polytechnic Society, 1861 | <i>The Society.</i> |
| Radcliffe Catalogue of Stars for 1845 | <i>Radcliffe Trustees.</i> |
| Journal of the Society of Arts, May to October | <i>The Society.</i> |
| Schrift der Königlichen Gesellschaft zu Königsberg, 1861, part 1 | <i>The Society.</i> |
| Verhandlungen des Vereins für Naturkunde zu Presburg, 1859-61 | <i>The Verein.</i> |
| Neunter Bericht der Oberhessischen Gesellschaft, 1861 | <i>The Society.</i> |
| Mittheilungen der K. K. Geographischen Gesells- chaft, Wien, 9 parts (Hefts) | <i>The Society.</i> |
| Memoires de la Societé imp. d'Emulation d'Abbe- ville, 1857, 1860, vol. 1 | <i>The Society.</i> |

NOVEMBER 8rd.

| | |
|---|---------------------|
| The United States' Survey of the Southern Hemisphere, vols. 1, 2, 3, 6 <i>The Superintendent of the National Observatory at Washington.</i> | |
| Patent Reports (Agriculture, Arts, and Manu- factures), from 1849 to 1858, 15 vols. <i>The United States' Patent-office, Washington.</i> | |
| Catalogue of the Astor Library, New-York, 4 vols. | <i>The Library.</i> |
| Journal of the Royal Asiatic Society, vol. 20, pt. 1 | <i>The Society.</i> |
| Journal of the Society of Arts, October 24 and 31 | <i>The Society.</i> |
| Journal of the Linnæan Society, No. 24 | <i>The Society.</i> |
| Quarterly Report of the Meteorological Society of Scotland | <i>The Society.</i> |
| On the Theory of the Polyedra, by the Rev. T. P. Kirkman, M.A., F.R.S., hon. member | <i>The Author.</i> |

| | Title. | Donor. |
|---|--------|---------------------------------|
| NOVEMBER 17th. | | |
| Transactions of the Royal Irish Academy, vol. 23, part 2, and vol. 24, part 2 | | <i>The Academy.</i> |
| Proceedings of the same, vol. 7, parts 1—8 | | <i>The Academy.</i> |
| Journal of the Franklin Institute, No. 442 | | <i>The Institute.</i> |
| American Journal of Arts and Sciences, No. 161 | | <i>The Editor.</i> |
| Canadian Journal of Industry, No. 41 | | <i>Canadian Institute.</i> |
| Medico-Chirurgical Transactions, vol. 45 | | <i>The Society.</i> |
| Journal of the Society of Arts, Nov. 1st to 15th | | <i>The Society.</i> |
| DECEMBER 1st. | | |
| Results of Meteorological Observations made under the direction of the Smithsonian Institution, 1854-9, 1 vol. 4to. | | <i>Smithsonian Institution.</i> |
| Smithsonian Miscellaneous Contributions, 4 vols. | | <i>Smithsonian Institution.</i> |
| Smithsonian Report, 1860. | | <i>Smithsonian Institution.</i> |
| Proceedings of the Boston Society of Natural History | | <i>The Society.</i> |
| Quarterly Journal of the Geological Society, No. 72 | | <i>The Society.</i> |
| Proceedings of the Royal Society of Edinburgh, 1861-62 | | <i>The Society.</i> |
| Proceedings of the Royal Geographical Society, vol. 6, No. 5 | | <i>The Society.</i> |
| Journal of the Geological Society of Dublin, vol. 9, part 2 | | <i>The Society.</i> |
| Journal of the Society of Arts, Nov. 21 and 29 | | <i>The Society.</i> |
| Monthly Notices of the Royal Astronomical Society, vol. 22, No. 9 | | <i>The Society.</i> |
| DECEMBER 15th. | | |
| Transactions of the Botanical Society of Edin- burgh, vol. 7, part 2 | | <i>The Society.</i> |
| Journal of the Franklin Institute, No. 443 | | <i>The Institute.</i> |
| Monthly Notices of the Royal Astronomical Society, vol. 23, part 1 | | <i>The Society.</i> |
| Journal of the Society of Arts, Dec. 5th and 12th | | <i>The Society.</i> |

| Title. | Donor. |
|---|--------------------|
| On some Inscriptions from Cyprus, by Commodore Leycester, R.N., F.R.G.S. | <i>The Author.</i> |

1863.

JANUARY 12th.

| | |
|--|----------------------------|
| American Journal of Arts and Sciences for Nov. | <i>B. Silliman.</i> |
| Proceedings of the Royal Society, No. 52 | <i>The Society.</i> |
| Transactions of the Royal Scottish Society of Arts, vol. 56, part 2 | <i>The Society.</i> |
| Canadian Journal of Industry, No. 42, N.S. | <i>Canadian Institute.</i> |
| Journal of the Franklin Institute, No. 444 | <i>The Institute.</i> |
| Proceedings of the American Philosophical Society | <i>The Society.</i> |
| Journal of the Society of Arts, 4 numbers | <i>The Society.</i> |
| Monthly Notices of the Royal Astronomical Society, vol. 23, No. 2 | <i>The Society.</i> |
| Proceedings of the London Royal Institution, part 2, 1861-2 | <i>The Institution.</i> |
| Proceedings of the Liverpool Philomathic Society, 1861-62 | <i>The Society.</i> |
| Le Tueur de Lions, par Jules Gérard | <i>The Author.</i> |

JANUARY 26th.

| | |
|--|--|
| Journal of the Society of Arts, Jan. 10 and 24 | <i>The Society.</i> |
| Journal of the Meteorological Society of Scot- land | <i>The Society.</i> |
| The North Atlantic Seabed, by Dr. Wallich | <i>The Lords Commissioners of the Admiralty.</i> |

FEBRUARY 9th.

| | |
|--|-----------------------|
| Journal of the Society of Arts, 2 numbers | <i>The Society.</i> |
| Journal of the Franklin Institute, No. 445 | <i>The Institute.</i> |
| Tenth Report of the Trustees of the Free Public Library of Boston | <i>The Library.</i> |
| Journal of the Royal Dublin Society, July— January, 1861 | <i>The Society.</i> |
| Proceedings of the Royal Society, No. 53 | <i>The Society.</i> |
| Proceedings of the Royal Geographical Society, vol. 7, No. 1 | <i>The Society.</i> |

| | Title: | Donor. |
|-----------------|---|----------------------------|
| | Mittheilungen der K. K. Geographischen Gesellschaft von Wien, 5te Jahrgang, 1861 . . . | <i>The Society.</i> |
| FEBRUARY, 23rd. | | |
| | Journal of the Society of Arts, 2 numbers . . . | <i>The Society.</i> |
| | Monthly Notices of the Royal Astronomical Society, vol. 23, No. 3 . . . | <i>The Society.</i> |
| | Proceedings of the British Meteorological Society, vol 1, Nos. 1—4 . . . | <i>The Society.</i> |
| | Eleventh Report of the Council of the British Meteorological Society . . . | <i>The Society.</i> |
| | Report of the Meteorology of England for 1861, vol. 1, Nos. 1—4 . . . | <i>The Society.</i> |
| MARCH 9th. | | |
| | Journal of the Society of Arts, March 7 . . . | <i>The Society.</i> |
| | Quarterly Journal of the Geological Society, vol. 19, No. 73 . . . | <i>The Society.</i> |
| | Journal of the Statistical Society of London, for 1863 . . . | <i>The Society.</i> |
| | Journal of the Linnæan Society, No. 25 . . . | <i>The Society.</i> |
| | Transactions of the Tyneside Field Naturalists' Club, vol. 5, part 4 . . . | <i>The Club.</i> |
| MARCH 23rd. | | |
| | Journal of the Society of Arts, March 13 and 20 . . . | <i>The Society.</i> |
| | Proceedings of the Royal Society, No. 54 . . . | <i>The Society.</i> |
| | Canadian Journal of Industry . . . | <i>Canadian Institute.</i> |
| | Monthly Notices of the Astronomical Society, vol. 13, No 4 . . . | <i>The Society.</i> |
| | Journal of the Franklin Institute of Philadelphia, No. 416 . . . | <i>The Institute.</i> |
| | On the Application of the Theory of the Polyhedra, to the Enumeration and Registration of Results, by the Rev. T. P. Kirkman, hon. member . . . | <i>The Author.</i> |
| APRIL 20th. | | |
| | American Journal of Science and Arts, No. 103 . . . | <i>B. Silliman.</i> |
| | Proceedings of the American Philosophical Society . . . | <i>The Society.</i> |

| Title. | Donor. |
|---|-----------------------|
| Monthly Notes of the Royal Astronomical Society, vol. 23, No. 5 | <i>The Society.</i> |
| Proceedings of the Royal Geographical Society of London, vol. 7, No. 2 | <i>The Society.</i> |
| Journal of Society of Arts, five weeks | <i>The Society.</i> |
| Journal of Franklin Institute, No. 447 | <i>The Institute.</i> |
| Proceedings of the Berwickshire Naturalists' Club, 1862 | <i>The Club.</i> |
| Proceedings of the British Meteorological Society, vol. 1, No. 5 | <i>The Society.</i> |

MAY 4th.

| | |
|--|----------------------------|
| Correspondenzenblatt des Vereins für Naturkunde zu Presburg, 1 Jahrgang, 1862 | <i>The Society.</i> |
| Memoires de la Societé Imperiale des Sciences Naturelles de Cherbourg, Tom. 7 | <i>The Society.</i> |
| Proceedings of the Academy of Natural Sciences Philadelphia, Nos. 7—12, 1862 | <i>The Academy.</i> |
| Report of the British Association, Manchester, 1861 | <i>Dr. Inman.</i> |
| Proceedings of the British Meteorological Society, vol 1, No 6 | <i>The Society.</i> |
| American Journal of Science and Arts, No. 104 | <i>B. Silliman.</i> |
| Canadian Journal of Industry | <i>Canadian Institute.</i> |
| Journal of the Society of Arts, 2 Nos | <i>The Society.</i> |
| Researches into the History of the Roman Con- stitution, by Dr. Ihne | <i>The Author.</i> |

INDEX.

| A | |
|-----------------------------------|-------|
| | PAGE. |
| Adjectives, Dr. Ihne, on the..... | 96 |
| Annual Meeting | 1 |
| Associates | 4 |
| Aqua-tinta Engraving, on..... | 132 |

| B | |
|------------------------------|-----|
| Birds of the Trias | 120 |
| Byrozoa, exhibition of | 77 |
| Boiling-point of Water | 166 |

| C | |
|---|-----|
| Cheirotherium..... | 118 |
| Coal, exhibition of, from New Brunswick | 68 |
| Coal-measures, fossils of the..... | 107 |
| ———, crustacea of the | 110 |
| ———, mollusca of the | 111 |
| ———, fishes of the | 115 |
| Collingwood, Dr., on the Ancient Fauna of Lancashire and Cheshire | 104 |
| Council for 1862-63 | 9 |

| D | |
|-------------------------------------|-----|
| Doris planata, exhibited | 177 |
| Duckworth, H., on the Arch of Titus | 142 |
| Dutch School of Engraving | 136 |

| E | |
|---|-----|
| Each, Dr. Ihne on the word..... | 93 |
| Ebullition, definition of..... | 161 |
| Edwards, Dr., defence of Mr. Williams' views on steam | 179 |
| Either, Dr. Ihne on the word | 91 |
| ———, Mr. Picton on | 141 |
| English School of Engraving | 137 |
| Engraving, History of | 180 |
| Essenes, their cardinal doctrines and practices | 182 |
| ——— observance of Sabbath | 186 |
| ——— sections and orders | 187 |
| ——— origin of the sect | 190 |
| ——— parallelism with Pythagorism | 191 |
| ——— date of..... | 201 |
| ——— derivation of name | 208 |
| ——— Philo's description of | 207 |
| ——— Pliny's ditto | 216 |
| ——— Josephus' ditto | 216 |
| ——— Caius Julius Solinus' ditto | 229 |
| ——— Porphyry's ditto | 230 |

| | PAGE. |
|---|-------|
| Essenes, Epiphanius' description of.. | 232 |
| ——— The modern literature on them | 235 |
| ——— De Rossi..... | 235 |
| ——— Dr. Thomas Godwyn.. | 238 |
| ——— Theophilus Gale | 240 |
| ——— Dean Prideaux | 241 |
| ——— Basnage | 242 |
| ——— Dr. Jennings | 242 |
| ——— Bellermand | 243 |
| ——— Neander | 243 |
| ——— Rappaport | 244 |
| ——— Gfrörer | 246 |
| ——— Dähne | 247 |
| ——— Frankel | 248 |
| ——— Hall..... | 250 |
| ——— Ewald | 251 |
| ——— Grätz | 252 |
| ——— Jost | 254 |
| ——— Herzfeld..... | 254 |
| ——— Hilgenfeld | 256 |
| ——— Westcott | 256 |
| ——— Milman | 275 |
| Etching | 130 |
| Equinoctial Weather Theory, remark on | 139 |
| Evaporation, definition of..... | 149 |

| F | |
|--|------|
| Fauna, the ancient, of Lancashire and Cheshire | 104 |
| Fishermen, their opportunities | 102 |
| French School of Engraving..... | 137 |
| Funds | 2, 7 |
| Future Tense, Dr. Ihne on the | 78 |

| G | |
|---|-----|
| Gallery of Inventions, report | 6 |
| ———, delegates | 10 |
| ———, opening of .. | 129 |
| Geology of Lancashire and Cheshire | 106 |
| Gérard, M. Jules, reads a paper | 36 |
| German School of Engraving | 134 |
| Geysers, explanation of the | 174 |
| Ginsburg, Rev. Dr., on the History of Engraving | 130 |
| ——— on the Essenes.. | 181 |
| Gorilla, dimensions of skeleton | 68 |
| Gothic terms of rural life | 44 |
| ——— household terms | 45 |
| ——— names of domestic animals.. | 47 |
| ——— weapons | 48 |

| | | | |
|--|--------|---|-------|
| Gothic military terms | 51 | | |
| Gyroscope, on some new Phenomena exhibited by the | 71 | | |
| H | | | |
| Herring-fishery, its extent..... | 108 | | |
| Hippopotamus, fossil..... | 121 | | |
| Hume, Rev. Dr., on the Manufacture of Stone Implements in ancient and modern times | 34 | | |
| I | | | |
| Ihne, Dr., Notes on English Gram- mar | 78 | | |
| —— on the word <i>thoile</i> or <i>thole</i> | 77 | | |
| —— retirement from the office of President..... | 257 | | |
| —— vote of thanks to | 257 | | |
| Inaugural Address of President | 18 | | |
| Inscriptions on the Arch of Titus.. | 145, 6 | | |
| Italian School of Engraving..... | 86 | | |
| K | | | |
| Kitchen-middens, remains at Wal- lasey and Hoylake | 118 | | |
| L | | | |
| Ladies, admission of, to meetings .. | 6, 10 | | |
| —— first admitted..... | 28 | | |
| Leasowe, submarine forest at | 122 | | |
| —— fossils collected in..... | 127 | | |
| Library..... | 5 | | |
| Lord's Prayer in Gothic, Anglo-Saxon, and Modern German | 88 | | |
| Lump-sucker exhibited alive..... | 101 | | |
| M | | | |
| Marine animals collected by Captain Baker | 189 | | |
| Megalicthys..... | 116 | | |
| Meteor, description of, by Mr. H. P. Horner | 65 | | |
| Mezzotinto, on..... | 182 | | |
| Mill, J. S., on his Theory of the Character and Proofs of Mathe- matical Doctrines | 27 | | |
| Mollusca of the coal | 111 | | |
| —— drift | 114 | | |
| N | | | |
| Nevins, Dr., on the Gyroscope..... | 71 | | |
| | | O | |
| | | Other and others, Dr. Ihne on the words | 94 |
| | | —— Mr. Picton on.... | 140 |
| | | P | |
| | | Picton, Mr. J. A., on the Ancient Gothic Language (part 2) | 87 |
| | | —— on the words, Other, Either, Or, and Whether | 189 |
| | | —— remarks on Mr. Reed's paper on Steam | 177 |
| | | Pottery from Chester exhibited | 26 |
| | | R | |
| | | Reed, Mr. E. J., on Armour-plated Ships of War | 29 |
| | | —— on a New Theory of the Generation of Steam..... | 148 |
| | | Report from the Council | 1 |
| | | Right and Wrong, by Dr. Commins.. | 68 |
| | | Robertson, Mr. D., letter to Dr. Col- lingwood | 101 |
| | | Runic System of Writing | 57 |
| | | S | |
| | | Salmon-hatching exhibited | 189 |
| | | <i>Shall</i> and <i>Will</i> | 78 |
| | | Silurian fossils at Coniston | 109 |
| | | Steam, summary of Mr. C. Wye Williams' Theory of | 178 |
| | | T | |
| | | Thoile, or Thole, Dr. Ihne on | 77 |
| | | Triassic Series of Cheshire | 117 |
| | | Traill, Dr., death of | 3, 11 |
| | | V | |
| | | Vaporization, definition of..... | 151 |
| | | Valedictory Address of retiring Presi- dent | 8 |
| | | W, Y, Z. | |
| | | Wallasey Pool, excavations in | 123 |
| | | —— great fossil ox in | 124 |
| | | —— human skull in | 127 |
| | | Whitworth guns, their effects | 29 |
| | | Williams, Charles Wye, investiga- tions on Steam | 141 |
| | | Yates, James, F.R.S., remarks on the Decimal System | 77 |
| | | Zostera Marina exhibited | 26 |

